UNIVERSITY OF TORONTO MEDICAL JOURNAL

MEDICAL EXTRAPOLATIONS

VOLUME XXXVIII

NUMBER 4

FEBRUARY 1961

easier swallowing after T & A

Xylocaine Viscous provides quick-acting and prolonged surface anesthesia for sore and painful throats, particularly those occurring after tonsillectomy and adenoidectomy. Its cherry-flavored, water-soluble vehicle spreads evenly and adheres intimately to the membranes. Nonirritating and nonsensitizing. Dose: 1 teaspoonful, swished around in the mouth and then swallowed slowly. In bottles of 100 cc. and 450 cc.

Write for additional information regarding other uses which include management of hiccup and reflex vomiting, as well as relief of discomfort associated with laryngoscopy, esophagoscopy, gastroscopy and the passage of esophageal and gastric tubes.

DO YOU HAVE THE 64 PAGE MANUAL "XYLOCAINE IN ANESTHESIA" ON YOUR REFERENCE SHELF?

ASTRA *Pharmaceuticals (Canada) Ltd. Toronto 4, Ont.*

XYLOCAINE® VISCOUS

(brand of lidocaine*)

CANADIAN PAT. NO. 503,645

MADE IN CANADA

INDEX

EDITORIAL 154

MEDICAL EXTRAPOLATIONS

THE OSTEOPATHIC SCHOOL OF MEDICINE, *A. V. DeJardine, D.O.* 155

CHIROPRACTIC, *A.E. Homewood, D.C.* 165

CHRISTIAN SCIENCE, *Leslie A. Tufts.* 173

THE PRESENT STATUS OF HYPNOSIS, *Thomas R. Verny, 6T1.* 175

RADIOLOGY OF THE CHEST, *G. Kalchman, 6T1.* 186

HAPTOGLOBIN, *Fred Rosen, 6T2.* 194

ECTOPIC PREGNANCY, *Martin Jerry, 6T1.* 198

CONVULSIVE DISORDERS, *C. H. Tator, 6T1.* 200

ON INSPECTION 184

ANSWERS TO ON INSPECTION 205

The Cover

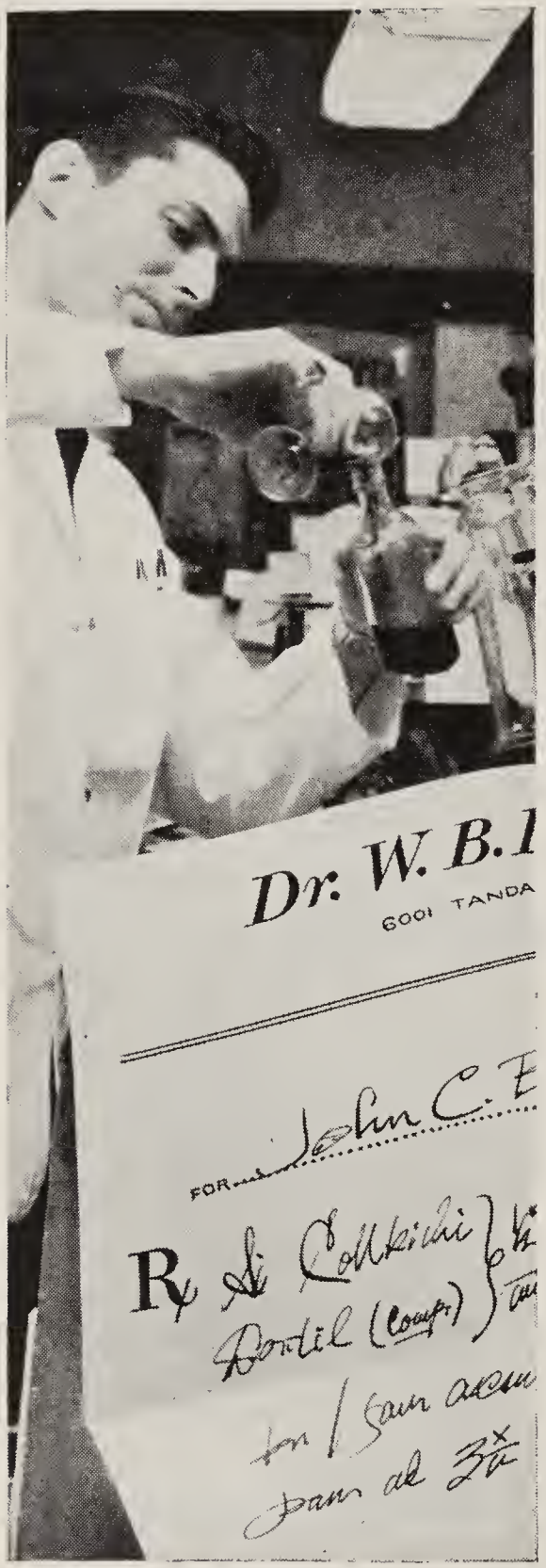
From the painting by R. Falkenburg, our cover this issue depicts the revival of hypnotism. Mesmerism becomes respectable once again. The doctrine, first propounded by Mesmer, a German physician, in 1778, has enjoyed periodic recognition throughout the years, particularly in this Journal. It is enthusiastically approached again only because of the excellence of the coverage given it.

The painting represents the consternation, skepticism, humor and disbelief which physicians display when confronted with the topics of this issue, grouped under the heading, Medical Extrapolations. We present them in this Journal for your information, edification or enjoyment, not because we have lost our direction.

L. E. S.

INDEX TO ADVERTISERS

ASTRA	INSIDE FRONT COVER
SMITH, KLINE & FRENCH	INSIDE BACK COVER
CIBA	OUTSIDE BACK COVER
ONTARIO RETAIL PHARMACIST'S ASS'N	Page 152
CANADA LIFE ASSURANCE	Page 154
POULENC	Page 164
WYETH	Page 172
PARKE-DAVIS	Page 178, 179
FROSST	Page 191
HOMEWOOD SANITARIUM	Page 204
OSBORNE'S PHARMACY	Page 204
PRINCESS MARGARET HOSPITAL	Page 205
DOWNS	Page 207
COW & GATE	Page 208



Your prescription... his command

Accepting your prescription as an express command, he dispenses your called-for pharmaceuticals according to your instructions with the greatest accuracy and care. His highly-specialized skill, plus his complete up-to-date dispensary are always at your service . . . even during the late hours of the night or early hours of the morning, should an emergency arise.

ONTARIO RETAIL PHARMACISTS ASSOCIATION

THE ONTARIO RETAIL PHARMACISTS' ASSOCIATION

UNIVERSITY OF TORONTO MEDICAL JOURNAL

ESTABLISHED DECEMBER 1923
AN UNDERGRADUATE PUBLICATION

NUMBER 4
VOLUME XXXVIII
FEBRUARY 1961

editor-in-chief

L. E. SOPER, 6T1.

editorial consultants

M. BARKIN, M.D. — P. B. DENT, M.D

associate editors

J. R. ALLEN, B.A., 6T1. — B. FOGEL, B.A., 6T1.
P. C. SAMU, 6T1. — J. J. MOGAN, M.A., 6T1.
C. G. CHAMBERLAIN, 6T1.

assistant editors

G. E. HOWEY, B.A., 6T2. — J. SOBRIAN, 6T2.
E. S. LILKER, 6T2. — W. O. R. SPITZER, 6T2.
D. P. SMITH, 6T2. — B, W. THOMAS, 6T2.

feature editors

abstracts and microabstracts..... J. H. GOLDIE, 6T1.
C. E. BAYLISS, 6T1.
book reviews..... R. BAUMAL, 6T3.
A. H. GERULATH, 6T3.
on inspection..... L. M. JERRY, 6T1.

managing editors

Miss R. S. SILVERSTEIN, 6T5. — K. H. SHUMAK, 6T5.

business managers

J. L. MADIGAN, 6T3. — T. D. C. MARSHALL, 6T3.

advertising department

W. S. CRYSDALE, 6T4. — R. N. FOWLER, 6T4.
Miss P. C. WHILLANS, 6T4. — Miss K. J. WYTOCK, 6T4.
EWE GHEE GOW, 6T4.

circulation

J. D. GRAHAM, 6T3, *manager*

R. BALL, 6T3. — F. LANGER, 6T4.

art and photography

Mrs. M.E. SOPER — R. S. GILDER, B.A.

This journal is published six times a year from November to April, by the Medical Society of the University of Toronto, to serve primarily as a medium for student expression.

Subscription rates: $4.50 for one volume of six consecutive issues. Single copies $.75 plus $.10 postage.

Manuscripts including references and footnotes should be typewritten double spaced on one side of the paper. References should be kept to a minimum, and should be cited numerically in order in which they appear in the text.

Illustrations are included by arrangement with the Editor. Drawings should be done on white paper in black ink.

Final Copy Date is the 15th of the month prior to issue. Mailing date is the 15th of the month of issue.

Material printed in this Journal is covered by copyright. Papers are accepted for consideration with the understanding that they are contributed for publication in this Journal only.

Correspondence should be addressed to Room 114,
Medical Building,
University of Toronto,
Toronto 5, Ontario.

Litho by Chromo Litho.

Authorized as Second Class Mail,
Post Office Department, Ottawa.

EDITORIAL

It is not inconceivable that at some future date, when we have long suffocated and buried our "unscientific and disreputable" cousins, some eminent medical pioneer will emerge from the tub and cry: "Manipulation. I've found it". Also, the thought comes to mind that we, in the heat of our self-esteem, might be what one could call fanatic in our approach. Our attitude of cool aloofness and disregard, condescending neither to praise or condemn, may very well be due to unfamiliarity with the issue at hand. It seems logical that if we are to do either, we must be equipped with knowledge.

Hence, this issue came as a genuine effort to probe into the less understood extrapolations of the medical horizon. Needless to say, it was begun with a great deal of adverse prejudice and a certain degree of circumspection which only our attraction for lucidity sufficed to overcome. It felt that these men, engaged in the handling of the sick, about whom all have heard and few have investigated, should be given an opportunity to acquaint us with their views. And if they had anything to teach us it was our duty to listen. It is a fact that osteopathic students spend as much time ironing the seats of their trousers as we do. Their school appears to consist of a dichotomy of medical training, as we know it, and an exotic fixation on the musculo-skeletal system. The chiropractor, on the other hand, has less training and, theoretically does not claim to be a true physician. His main concern is the skeleton in general and manipulation of the spine in particular, though it is difficult to see at what point he considers a disease process beyond the sphere of his manipulative domain.

The reader would do well to lend an open mind to these articles written by top men in their fields, if for no other reason than to gain a position of disagreeing with their teachings on a rational basis rather than under the pretentious gown of total ignorance.

P.C.S.

GIR

GUARANTEED INSURANCE REGARDLESS?
could be, but the letters
really stand for
GUARANTEED INSURABILITY RIDER
a clause that will guarantee
the right to purchase
additional amounts of "Life"
every three years between
ages 25 and 40, without
evidence of insurability.

Financial Planning
for professional men.

Call HU.5-9151

ED QUINN

DAVE NAIRN

THE CANADA LIFE ASSURANCE COMPANY

THE OSTEOPATHIC SCHOOL OF MEDICINE

A. VICTOR De JARDINE, D.O.
President, Ontario Osteopathic Association,
Toronto, Ontario.

The art of healing is as ancient as man. Medicine and religion evolved as a response to primitive man's needs and his interpretation of the catastrophic forces of nature in terms of the supernatural. The medicine man, as the tribal priest and physician, performed magical rites and rituals designed to supplicate, appease and placate the gods, the evil spirits and the demons of disaster and disease. Throughout the centuries magic was mingled with empiricism until scientific observation and investigation enabled man to interpret natural phenomena in terms of natural law. A continuum ran through all these ages of man's history. Healing was an art based on an ever changing and evolving interpretation of the forces and phenomena of health and disease. Osteopathy is a part of this continuum.

Medicine can be defined as a body of knowledge covering the ills that beset man's animal body and the methods and means of maintaining it in health and administering to it in disease. It is a discipline, as is science, philosophy, law or theology, and hence a part of man's learning. So used, the term "medicine" does not refer to the profession of medicine or organized medicine.

Osteopathy is a word that defies definition, for actually it is a word that refers to an organized movement for the continual reorientation of medicine; a movement within past, present and future medical history. The word "osteopathy" like so many other words in our language, is not helpful to the uninformed, and standing alone imparts no meaning. The term "osteopathic medicine" is synonymous with the word "osteopathy". It is historically and semantically valid, and properly employed is usefully descriptive.

Osteopathy can be and has been defined for the purposes of legislative enactments and the rendering of judicial opinions, thus: Osteopathy is one of the two healing art professions that provide a complete health service to its people; the other is the profession of medicine. Their practitioners are referred to, respectively, as doctors of osteopathy and doctors of medicine. Of these two groups of physicians and surgeons, one group has the degree D.O. (doctor of osteopathy) and the other has the degree M.D. Doctors of osteopathy are trained in all branches of medicine and surgery, including obstetrics, the use of drugs, manipulation and operative surgery. Both groups are professions within "medicine", that age-old continuum of knowledge having to do with man in health and disease.

HISTORY

By the beginning of the 19th century, the healing art required a reformation. The reformationists first appeared in Europe. In Germany the pseudoscience of phrenology promulgated by Gall; in Austria, Franz Anton Mesmer with his hypnotic doctrine of "magnetic therapy"; in Scotland, John Brown's new system of Brunoism; in France, the physiologism of Broussais, whose followers bled their patients white; the sects of vitalism, animism, Grahamism, hydrotherapy, Naturphilosophie each had its day. In Germany, Hahnemann developed the powerful therapeutic school of homeopathy, on the beliefs that the potency of a drug was increased by dilution. In North America the reformers were also at work. Benjamin Rush's medical reform with its heroic purging and blood-letting claimed more lives than the American Revolution. Dr. John E. Cook carried the use of calomel to unheard-of extremes on the frontier. The New England farmer Samuel Thomson, noting that heavy metals pull downward while plants grow upward, established a basis for a system of herb healing. Numerous medical shcools were established to teach the doctrines of Thomsonism. Later in the century Mary Baker Eddy founded the healing system of Christian Science.

By mid-nineteenth century American medicine spoke with three voices: the allopathic or "old school" practitioners, Hahnemann's homeopathy, and the eclectic school of the Scotsman Bennett. A shameful and bitter controversy raged between these three for over 50 years. Out of this controversy osteopathy developed as a school of medicine. Its beginning, as a profession, marked the last of the schools and systems of medical practice that characterized the 18th and 19th century. Fifty years ago, osteopathy was the smallest of the four variants of medical therapeutics extant in the United States.

The founder of osteopathy was Andrew Taylor Still (1827 - 1917), son of an itinerant Methodist preacher and doctor. Dr. A.T. Still began his professional life as a country doctor with no more or less training than other country doctors. He supplemented a medical apprenticeship, served with his father, by several terms in a Kansas City medical school. As a registered physician and surgeon in Missouri, he appears typical of many doctors of medicine of his time and midwestern environment, except that he had a questioning mind that was not satisfied with a situation in which a person in need of a phy-

sician stood more than an equal chance of being worsened by the encounter. Shortly after the Civil War, Still began to question the worth of medicine as he knew it to be practised. Its armamentarium consisted of polypharmacy, supplemented by bleeding, purging, blistering, leeching and puking. Beginning with basic priciples, Still came to the conclusion that the human body is self-healing, that its adequate functioning depends upon its unimpaired structure and that an uninterrupted nerve and blood supply to the tissues is indispensable to the normal functioning of all parts of the body. He also held that abnormalities of the skeletal, muscular and ligamentous tissues, especially of the spinal column, resulted in interferences with normal nerve and blood supply and involved reciprocal relationships among all organs. No attempt should be made to interpret these fundamental principles of seventy-five years ago in terms of the complex physiologic knowledge of today.

Medicine, like other forms of human endeavour, is moulded by the tides of social background through which it moves. Advances in knowledge and technique have not been the result of chance, but rather are the products of the human totality of their times. Often some propitious person or significant event is credited as the source of an outstanding advancement. Such superficial homage is frequently carried to extremes in the healing arts. Published accounts of the origin and early development of osteopathy have followed this same pattern of idolatrous interpretation. It is not to disparage Still, to say that "it's the age that makes the man", and if he had not promulgated this reform movement, someone else would have.

EARLY DEVELOPMENT AND RELATIONSHIP TO MEDICINE

Still had a flair for practical invention and was mechanically inclined. With ingenuity and no precendent (there is no evidence that he had been influenced by the practices of European bone-setters) he worked out a system of manipulation intended to realign functional deviations and abnormalities. Osteopathy began as a reform movement within medicine in 1874 when Still made known his beliefs. For the next eighteen years it was a one-man profession. In 1892 the first teaching institution was established, Article 3 of the Articles of Incorporation stating:

> "The object of this Corporation is to establish a College of Osteopathy; the design of which is to improve our present system of Surgery, Obstetrics and the treatment of disease generally, and place the same upon a more rational and scientific basis; and to impart information to the medical profession; and to grant and confer such honors and degrees as are usually granted and conferred by reputable Medical Colleges".

It is interesting to note that the charter granted the Corporation (American School of Osteopathy) the right to confer the degree M.D.; however the D.O. degree was chosen.

There is no evidence that Still identified the distinctive therapy he developed as representing all there was to medical knowledge. Osteopathic manipulation was never synonymous with osteopathy. The sharp limitations of medical therapy at that time resulted in the wide employment of manipulative procedures in osteopathic practice. It is a simple fact that prior to 1920 osteopathic principles and techniques applied and administered by an intelligent, critically-minded and informed D.O. proved to be effective therapy for the general run of diseases for which there were no durgs or remedies of demonstrable value. There is no other way to explain the phenomenal success of doctors of osteopathy during the profession's first three decades. Although a revolution in medical practice was in the making, in Europe, at the time osteopathy emerged on the American scene, it had little effect in America until after 1910. Routine osteopathic manipulation, empirically administered, apparently did as much, if not more, to arouse the defensive mechanisms of the ailing human body as the contents of the most extensively stocked medical bag. At least the treatment administered did not hinder the development of immunologic reactions.

Practically all of osteopathy's earliest leaders conceived it to be a movement for a new orientation within medicine, but almost at once osteopathy found itself set adrift from organized medicine. Revilement of Still, his school and its graduates began almost immediately at the local level. The lines were rapidly drawn between the osteopathic and medical camps, and by 1905 they had extended to organized medicine at the State level. From then on the struggle between the two professions assumed a national pattern, determined by the American Medical Association (A.M.A.) on one hand and the American Osteopathic Association (A.O.A.) on the other. Belated battles conducted by a few state medical societies still have as their goal the limiting of the full practice scope of doctors of osteopathy.

However, osteopathy was not separated from medicine's philosophical, scientific and technological aspects, only from its organizational aspects. As one scientist has put it, "Osteopathy would have withered almost immediately had it really been separated from the many-centuries-old vine of medicine on which it grew and con-

tinues to grow". It has been said that at its inception, osteopathy was opposed to the practices of the other schools of medicine, but that now it no longer holds such opposition. The osteopathic profession was opposed to the then prevailing practices of medicine, the principle of "laudable pus" and treatment by "drug and purge, puke and blister". It still opposes those practices, but has been joined in opposition by most of the best doctors in the civilized world and all the great faculties of medicine in the great universities.

In the period since the birth of the osteopathic profession, the world has witnessed a medical advance greater in magnitude and total effect than that of the entire period of 2,300 years since Hippocrates. The advance has brought a dramatic expansion of knowledge in the biological and medical sciences regarding the human organism, regarding those organisms by which man is affected, and regarding many disease processes, and great elaboration, refinement and innovation in techniques for the detection, diagnosis and treatment of many diseases and their sequelae. With the decline of the microbial diseases especially, there has been the twenty-year increase in life expectancy at birth. The osteopathic profession has welcomed, and continually incorporated into its practice and teaching, the new knowledge and techniques. The osteopathic physician, the osteopathic profession and the osteopathic colleges find themselves in a totally different environment from that which surrounded their origin.

OSTEOPATHIC EDUCATION

There are six colleges of osteopathy, all in the United States; at Philadelphia, Chicago, Des Moines, Kansas City and Kirksville, Mo., and Los Angeles. A minimum of three years of preprofessional college education, in an accredited college or university, is required for admission to professional education, with specific credits in certain subjects such as English, Physics, Biology and Chemistry. The curriculum of an osteopathic college requires, as a minimum, four standard academic years (36 weeks per year) of at least 1,000 hours instruction per year. In acutality the total course runs from 148 to 164 weeks including from 5,500 to 6,200 hours. Comprehensive instruction is required in the following subjects: Anatomy, Embryology, Histology, Physiology, Bio-chemistry, Pharmacology, Toxicology, Sanitation, Bacteriology, Comparative Therapeutics, Materia Medica and associated subjects, Pathology, Public Health, Hygiene, Obstetrics, Gynecology, Osteopathic Medicine, Parasitology, Immunology, Radiology, Surgery, Orthopedic Surgery, Urology, Otorhinolaryngology, Ophthalmology, Anesthesiology, Osteopathic Principles and Technique, Internal Medicine, Neurology, Psychiatry, Pediatrics, Dermatology, Syphilology, Therapeutics, Tropical Medicine.

These are the subjects that are generally accepted as necessary to train physicians and surgeons. The training is given in the colleges and their hospitals and clinics. The object of osteopathic education is to train a well-rounded general practitioner capable of advancing into specialized practice upon the completion of further post-graduate training. The official accrediting agency for osteopathic education, as recognized by the United States Office of Education and the respective state licensing boards, is the Bureau of Professional Education of the A.O.A. (Medical schools are accredited by a similar agency of the A.M.A.)

Following graduation, 99% of osteopathic graduates pursue a twelve month rotating internship in a hospital approved for that purpose by the Committee on Hospitals of the A.O.A. Residencies are available for training in the specialty fields with standards established by the osteopathic specialty boards. Certification follows the successful completion of a five year program. The twelve boards of specialty certification are: the American Osteopathic Board of Anesthesiology; of Dermatology; of Internal Medicine; of Neurology and Psychiatry; of Obstetrics and Gynecology; of Ophthalmology and Otorhinolaryngology; of Pathology; of Pediatrics; of Physical Medicine and Rehabilitation; of Proctology; of Radiology; of Surgery. There are some 400 osteopathic hospitals in the United States, most of which are staffed entirely by D.O.s, although some have mixed M.D. — D.O. staff. There are also a number of medical hospitals with D.O.s on the staff.

LICENSURE OF OSTEOPATHIC PHYSICIANS

There are approximately 13,500 osteopathic physicians practising in the United States, with 193 in other countries of which 100 are in Canada (68 in Ontario). There are no accredited osteopathic colleges outside the United States. 97.4% of the osteopathic physicians in the U.S. are in states in which they are unrestricted in their medical practice. In the twelve remaining states, where 2.6% are located, there is some restriction on the use of surgery of drugs, or both. In the Canadian provinces there are restrictions varying from British Columbia where major surgery is restricted, to Ontario where surgery, obstetrics and the use of drugs is not allowed. In Ontario, since 1925, the osteopathic

profession has been in the unfortunate position of being restricted by the regulations of the Drugless Practitioners Act. It is obvious that osteopathy in Ontario has not been permitted to grow in stature, as in the United States, in spite of the fact that the osteopathic physicians in Ontario were classmates of the 97.4% in the U.S. who have achieved success in all fields of medical endeavour. The fact that the profession has survived at all in this barren environment, suggests that the distinctive feature of osteopathic medicine, although it should not stand alone, has been used successfully for the betterment of the health of many people.

THE OSTEOPATHIC APPROACH

One of the original principles of osteopathy was that the body contains within itself all the materials and forces necessary to maintain it in a state of health or to combat disease. The implication is that this biological organism has the inherent capacity of manufacturing everything which is needed to achieve a balanced relationship to its environment. In 1874 this was in complete defiance of accepted medical teaching, that disease is an entity which has somehow seized upon an individual and that the right remedy will drive out the invader, leaving the individual again in a state of health. Within a decade, a cellular theory of immunity was established, stating that within the body are manufactured cells that are phagocytic with the power of engulfing bacteria and other noxious agents and destroying them. About 20 years later, Paul Ehrlich showed that within the body are produced chemical agents, antitoxins, agglutinins and precipitins that defend against disease. These theories are well accepted today.

Another of the basic principles of osteopathy is that physiological function is dependent upon anatomical or structural integrity; that structure and function are inter-related and inter-influential; that normal structure in all parts of the organiam is necessary for maximum functional efficiency. Though heterogeneous in its cellular tissue and organic structure, the body functions as a unit in both health and disease. The body in illness and distress is acting normally to the pathology of its structure at the time. It is regulated, integrated and co-ordinated in all its functions through its circulatory and neuro-endocrine systems. It is obvious that the understanding of the nature and relation of the nervous, muscular, ligamentous and other skeletal tissues to the disease process has been modified and broadened in recent years.

The practice of osteopathy is based on the concept that health depends on the maximum balanced utilization, liberation and development of man's intrinsic biological resources for the fullest possible expression of the "wisdom of the body" in human life; for resisting and combatting noxious influences in the environment and for compensating for their effects; for meeting, with adequate reserve, the usual stresses of daily life and the occasional severe stresses imposed by extremes of environment and activity. Disease begins when these resources and capacities are reduced or when exceeded and overcome by noxious influences. In the osteopathic view, impairment or a failure of a part of man's body or of a process is at once contributor to and product of the impairment, inadequacy or failure of the man as a whole. Therefore, while giving palliative and curative attention to such disease as may already be in progress, it is especially the function of the physician to create the circumstances which make possible and maximum and balanced operation of the individual's resources in the recovery and maintenance of health. This can be done only by identifying those factors in human life in general, and in the individual in particular, which favourably or unfavourably influence those resources, and then modify them in the most advantageous directions.

Osteopathic medicine recognizes, with other schools of medicine, that many factors have major influence on the capacity of the body to meet the demands, activities and environments of life, and the capacity to maintain and recover health. However, osteopathy distinctively recognizes and gives emphasis to factors arising in the human framework, and to their management by manipulative therapy. Though this emphasis on these factors and their manipulative control are often mistakenly identified as the sole feature of osteopathy and though in the osteopathic view, they are essential and indispensable components of clinical practice, they derive their meaning from the total context of the osteopathic concept. Concerned as the osteopathic physician is with the whole individual, he utilizes all available and proven means in the treatment of diseases and in the maintenance and restoration of health. The concept guides the selections he makes from his armamentarium and their application on behalf of the individual.

Man acts upon the world in which he lives through the agency of his musculo-skeletal system, the most massive and extensive system of the body. His sensory and nervous systems interpret that world and direct and organize his action. Even his innermost life has value and meaning only insofar as it can be expressed and communicated through the action of skeletal musculature. The collective function of all organs, except the reproductive, is the maintenance of that primary machinery of life. This

includes the nourishing, cleansing, protection and repair of that machinery, and the regulation of the internal environment in which its cellular components live, as expressed in the concept of homeostasis. The musculoskeletal and visceral organ systems are, therefore, integrally linked in their functions, each continuously communicating with and responding to the other, through the nervous and circulatory systems. The central nervous system continues to serve as a major communication system in disease as well as in health, and plays a major role in organizing the disease response. Osteopathy has also made clear the corollary that the central nervous system and the autonomic nervous system, which are ordinarily considered to be so separate and distinct that one is assigned to the neurologist and the other to the internist, are really one, and the province of every physician.

Health depends on harmonious balance between the requirements of the systems that react directly with the external environment, and the meeting of those requirements by the integrated activities of the visceral systems — the organs of maintenance and guardians of the internal environment. Disease is disharmony between these two functions. Such disharmony is induced by excessive demands incorrectly communicated, and by reduced capacity or disturbed integration of the organs to meet these demands, through prior damage, injury or impairment. Because of this reciprocal interinfluence, the state of the musculoskeletal system and of its parts both reflects and influences the adequacy and the operation of all other parts. This principle, in conjunction with the accessibility and responsiveness of the musculoskeletal system, is the very basis for the distinctive features of osteopathic diagnosis and therapy. In non-osteopathic practice, the musculoskeletal system is dealt with only as a part to be straightened, developed, healed, repaired or re-educated.

Man is not only a unit; man is a different kind of unit. Because of the basic similarities between the cells, tissues and organs of man and those of animals, the bulk of knowledge about man's parts has been deducted from studies on animals. However there is a different totality in which those parts operate. Man is different in two apparently different but closely related ways: he has acquired a highly complex cerebral cortex, and he stands and moves on his hind legs. The cerebral cortex is important to man's health as a sensitizer to an infinite number of new factors unimportant in the lives of other species. The magnificent cantilever bridge of the quadruped animal, sturdily yet flexibly supported on four rugged pillars, with the weight evenly distributed throughout the entire length, has in man been converted into a makeshift skyscraper, with the spinal column balanced vertically and precariously on one end, with the pelvis converted into a major weight bearing device, supporting the entire weight of the trunk and head, and serving as a floor for the internal viscera.

Such a structure is inevitably an unstable one and over a period of time, some buckling, leaning, curvature, asymmetries, stresses and strains will develop; the greater the time allowed, the greater the probability. The place and severity of the breakdown differ, of course, from individual to individual, according to variations in build, activity, occupation, age, environment, temperament. These musculoskeletal stresses and the body's response to them are the musculoskeletal lesions, whose recognition and control is a major contribution of the osteopathic profession to the medical sciences. The importance of the musculoskeletal lesion to the health of man derives from the unity of the body, from its impact on the total man.

THE MUSCULOSKELETAL LESION

The precise nature of the musculoskeletal lesion, or the mechanism by which it exerts influence is only slightly known. Research investigations indicate quite strongly that the musculoskeletal stresses start unbalanced streams of impulses into the central nervous system, which have the effect of upsetting the delicate balance of that part of the nervous system with which the lesioned part is most directly connected. There is an increased irritability of at least some representatives of each of the kinds of cells arising in that part of the nervous system — the ascending cells that convey pain, the motorneurons supplying skeletal muscles, and autonomic neurons supplying viscera, blood vessels and glands, including the sweat glands. The effect appears to be that of increasing the reflex excitability of these cells, with exaggeration of the influences which those nerve cells normally exert on the tissues which they supply.

There is evidence of hyperirritability of the sensory pathways, motor pathways and the sympathetics. Since these pathways are easier to open, they are said to be facilitated. Facilitation of sensory pathways signifies that the lesion represents a point of easy entree to the nervous system and easier access to the higher centres. It is a segment through which environmental changes have exaggerated impact upon the man. Facilitation of motor pathways leads to sustained muscular tension in local areas, exaggerated responses, spasm and additional sources of afferent bombardment to the nervous system

at this level. Experimentally, using the sweat glands as physiological indicators of local sympathetic activity, it has been shown the ease with which sympathetic fibres were reflexly excited in areas of lesion. Similar experiments have shown similar differences in vasomotor activities and tone, the disturbed segment showing evidence of vasospasm, with a possibility that in the chronic process, the ischemia may resolve itself into hyperemia, congestion, stasis and edema.

There is strong reason to believe that the sympathetic hyperactivity in dermatomes related to the lesioned segment extends also, to some extent, to segmentally related viscera. There is strong experimental and clinical evidence that the vasomotor responses of viscera are parallel to those of corresponding segments of skin, ischemia of one being associated with ischemia in the other. In effect, the lesioned segment and its associated structures are in a constant state of physiological alarm. To a person familiar with the physiological effects of a sustained state of anxiety, it could be stated that the lesion appears to be a similar thing on a local scale. The responses of the tissues to normal and abnormal influences have been altered and impaired, and their functional integrity threatened by ischemia or congestion and excessive sympathetic discharge. The clinical effects depend on the segment involved and on all the circumstances operating in a patient's life.

The musculoskeletal lesion is identifiable through the associated abnormality in soft tissue supports, in osseous relationships and joint-motion characteristics; by alterations in trophic, sensory, motor and autonomic functions of the associated tissues. These lesions are identified and evaluated by palpatory, visual, radiographic and other methods of examination for these criteria. Wherever they may occur, whether distinctly symptomatic or not, the lesion to some extent impairs the total resources of the individual. They impose especially deleterious influences and demands upon organs and tissues which receive their nerve supply from corresponding or affected portions of the nervous system. Conversely, since the musculoskeletal system is dependent upon the support of the organs of maintenance and on their sensitive responsiveness to its demands, disturbances in those organs or in the integration of their function is reflected in the musculoskeletal tissues. Because of the intimate neural links between the somatic and visceral tissues, disturbances in specific organs, or parts, are often revealed to the skilled examiner, in the nature, location and distribution of musculoskeletal lesions. Skillful palpation therefore helps to reveal the general clinical status of the patient.

The strategic therapeutic importance of recognition of the etiologic and diagnostic significance of the musculoskeletal lesion lies in its accessibility, detectability and responsiveness to appropriate therapy. Since the lesion in the apparently well individual is, and reflects, early departure from health which in itself is not disease, but the potential vanguard of disease; because it reflects and influences the adequacy of the individual's responses to the demands of life and his vulnerability and predisposition, then early diagnosis and treatment of the lesion and of the postural stresses from which it developed, represent a contribution to the prevention of chronic degenerative disease which awaits the broadest possible application.

A PHILOSOPHY OF OSTEOPATHY

The study of the philosophy of osteopathic medicine may be divided into three phases: a philosophy of health, a philosophy of illness, and a philosophy of recovery.

1. *A Philosophy of Health:* the laws of normal physiologic response to structural integrity. The relationship between structure and function is fundamental. The body is designed by nature to cushion all usual stresses, physical, mental and emotional.

2. *A Philosophy of Illness:* what happens when damage to structure or function occurs which the body, unaided, cannot restore to normal. What the body does in such cases makes up volumes in medical literature. The whole of pathology is wrapped up in this answer. The response in acute conditions is well enough recognized to require no further mention here. The effects in chronic cases are legion and constitute many complex conditions which face the physician. Nature is never static and as long as the patient lives resultant changes are taking place. This leads to the study of compensations, substitutions, imbalances and the vicious cycle. When function fails for any reason, the body often offers a substitution. This substitution does not always contribute to a normal physiological function. When resorted to frequently, abnormal function tends to become established, and any abnormal function is not static but retrogressive.

With structural imbalances, osteopathy has brought a new concept into the field of therapeutics, for many types of illnesses. For example, a flat foot, a sacroiliac strain, an anatomical short leg, a localized spinal lesion and many other conditions, may result in imbalances for which nature tries to make amends, often worsening the condition. Again nature is not static, and the results are often continuous and retrogressive if allowed to continue. The effects go from bony framework to softer supporting tissues, and from there to disturbances of the

nervous and circulatory functions. The chemistry of the body always becomes a casualty to a greater or lesser degree.

Whether the insult be a structural lesion, the introduction of a foreign body or of a poison, nature does something about it. If unable to restore normality it usually leaves some other effect which it is also unable to remove or restore. It may be a contracture, a perverted function, a scar, etc. Thus the vicious cycle is established, each effect becoming a potential cause of other effects. Often the effect reacts back upon its cause, completing the cycle. Not all effects become causes or man would be unable to survive. Since any function, normal or abnormal, must be based on corresponding structure, the normal cell structure must gradually yield to a structure corresponding to the changed function. Eventually these changes show microscopically and even macroscopically. After cellular change has become established, the removal of the disturbing cause may not allow the return to normal function, as the abnormal function is now established in the cellular structure, more or less harmoniously with it, although not harmonious with the entire body economy. In other words, the body in illness or distress is acting normally to the pathology of its structure at the time.

3. *A Philosophy of Recovery:* the application of such therapeutic procedures as will restore structure and function to as near normal as possible, under existing conditions and with the least inconvenience to the patient. This means approaching the patient at the point where he now is and striving to unravel the complexity of the case in the most efficient manner possible. It is important to know how the body has already responded and how it will respond to the assistance rendered. Since all forms of therapy may be influenced by psychosomatic factors, any system of therapeutics must consider the role of mental influences which may alter the physiologic responses of the body.

THE MUSCULOSKELETAL LESION AS AN ETIOLOGICAL FACTOR

Let us briefly consider the musculoskeletal spinal lesion as an etiological factor in disease. Local disturbances in the area of lesion may cause the following problems:

1. Joint movement pathologies, pain, stiffness, swelling, restriction of the normal motion pattern in the area.
2. Mechanical irritation of spinal nerve roots as they emerge from the cord. This usually involves the anterior and posterior primary divisions and their related distribution, sensory, trophic, motor and autonomic.
3. Disturbances in circulation of the cord and its coverings. This may be arterial, but more often it is a disturbance of the venous drainage, apparently causing localized congestion and edema.

These local pathologies can explain many of the disease states directly associated with the musculoskeletal spinal lesion. Amelioration of the local disturbance, removal of the noxious local influence causes the local disharmonies of tissue to subside. As normal joint movement is established, stiffness, swelling of the local and associated tissues subside, neuralgia and neuritis are alleviated, cord irritation ends. The major complicating factor to this localized lesion is that a systemic toxemia, from any cause, will gradually involve this local area of lowered vitality and produce secondary tissue changes, usually in the form of a low grade inflammation. Permanent relief will not be secured until this toxic factor is eliminated.

Over and beyond the local, limited problem just described, osteopathic medicine claims a much wider field of influence and importance, and there is clinical evidence to indicate that the local disturbances of tissues in the musculoskeletal spinal lesion and many other musculoskeletal pathologies is intimately associated with remote systemic disease. These lesions will present a definite pattern, consisting of an area in which pressure-pain, muscular contracture or localized myofascial tension exists, where there will be changes in motion characteristics, temperature changes, vasomotor changes in the skin, changes in sweat gland activity, etc. When this pattern is mapped out, it becomes a guide to the visceral area involved in systemic disease. This pattern will neither designate a disease nor necessarily a particular organ, but will point to an area segmentally related through the nervous system with the musculoskeletal lesion.

These lesions may be classified as primary, predisposing or secondary. If the lesion is *primary*, normalization of the tissue components of the lesion area or a blockade or interruption of its associated nerve pathways will result in normal systemic function. This does not suggest any "push button mechanism", directly connecting a particular organ with a specific musculoskeletal lesion. Rather it seems that the mechanism involved in the disturbance is an unbalancing influence in the segmental nerve impulses, probably interfering with the normal autonomic outflow. Under the bombardment of such disturbed innervation, an involved system or organ cannot function normally. As a clinical entity, the musculoskeletal lesion as a primary cause of systemic disease is not common.

The lesion is apparently a frequent *predisposing* etiological factor. Here reference is made to

the long-range, deleterious, noxious, disturbing influence of the musculoskeletal lesion. For example, structural faults that have been present for a long time gradually impair homeostasis. This is the type of musculoskeletal lesion that creates an area of lowered resistance systemically so that the stresses and strains of life, when not compensated, will be revealed in this area of lowered resistance as pain and dysfunction.

This so-called *secondary* or *reflex* musculoskeletal lesion is not so easy to identify as an etiological factor. In this case the main source of irritation arises in the viscus or the distant systemic disease itself, the local tissue changes in the area of musculoskeletal relationship will be similar and always follow a predictable pattern. There is clinical evidence to show that there will be diffuse sensitivity in the area of musculoskeletal involvement, in the early and acute phases of visceral or systemic disease. Later on, the area of sensitivity diminishes in size and often disappears if the viscus recovers or the disease is removed. However, if chronicity develops, the musculoskeletal lesion becomes better defined and localized. There is good reason to believe that at this point the musculoskeletal lesion itself becomes a maintaining factor for the disease process, because the lesion is an irritating factor in the vicious cycle which disturbs autonomic balance. If the pathology is reversible, amelioration of this secondary musculoskeletal lesion will improve visceral and systemic function.

This is an oversimplification of the situation, but it is a broad approach to the musculoskeletal lesion as an etiological factor. The clinical problem is to relate these facts and these well-working theories to the various tissues and viscera and systems of the body, with their differing functions and rates of reaction. There is a balancing tendency in nature and the practising physician must seek to find what is out of balance, or what is disturbing balance. The musculoskeletal lesion is an etiological factor that is distinctly osteopathic, and as pointed out, it may be primary, it may be a contributing or maintaing factor, or it may be reflex. Whatever its nature, it should be identified and considered in a proper program of diagnosis and treatment.

OSTEOPATHIC MANIPULATIVE THERAPEUTICS

For the sake of this paper, therapy may be divided conveniently into six catagories, all of importance, but only the first mentioned will be discussed here:

1. Osteopathic manipulative therapy
2. Surgical therapy
3. Physical therapy — cold, heat, electricity, X-Ray, radium, isotopes.
4. Substitution therapy — diet, endocrines, vitamins, amino acids, serums, biologicals.
5. Adjunctive therapy — antiseptics, anesthetics, antibiotics, specifics, symptomatic drugs.
6. Psychosomatic therapy.

Osteopathic manipulative therapy consists of measures designed to maintain and restore structural integrity by manipulative techniques. The precise scope of such therapy cannot be accurately circumscribed since new techniques are constantly being devised and research is increasing the available information concerning the nature of musculoskeletal lesions.

The manual techniques used in osteopathic manipulative therapy conform to certain mechanical principles and may be specifically *corrective* and designed to remove musculoskeletal lesions, or they may be palliative and designed to bring about physiological responses and to encourage the defensive reactions of the body.

Specific osteopathic manipulative techniques consist in passive movements applied to the body for the purpose of correcting abnormal structure. Many structural abnormalities involve spinal articulations, with limitation of motion, muscular imbalance, postural imbalance and reflex circulatory disturbances. Structures other than articulations may be involved such as fascia, supporting connective tissues, and muscles which may be in a state of reflex contracture. The forces used in corrective manipulations are leverage, traction and pressure. These are applied with due regard for the mechanical principles involved, the character of the tissue, the nature and extent of the pathology, and the reaction of the patient.

Palliative osteopathic manipulative technique is employed for the alleviation of symptoms and may be used in conjunction with the specific corrective techniques. It consists of a wide variety of manipulative maneuvers which have been found useful in clinical practice. Palliative therapy should have these objectives: symptoms must be controlled; physiological processes must be activated; defensive reactions must be encouraged. In osteopathic manipulative therapy these ends are accomplished by mobilization of the articular surfaces as well as stretching of soft tissues to relieve muscular contraction and tension of fascial structures. Manipulation of soft structures adjacent to inflammatory processes is designed to stimulate local circulation. Paravertebral pressure and traction is used for its effects upon the autonomic system. Pressure

over peripheral nerves may serve to alleviate localized pain. Stimulation of respiratory movements and general muscular relaxation may profoundly affect the response of the body as a whole to various types of injury.

Osteopathic manipulation accomplishes much through the application of treatment to and through the musculoskeletal system. Regardless of the type of manipulation used, it should be explained on an anatomical and physiological basis, and manual dexterity should characterize its use.

The osteopathic concept states that all therapy should be based upon a total evaluation of the patient. Anything less than this is incomplete diagnosis and treatment. It is realized that it may be impossible to completely evaluate every patient who is seen and that incomplete therapy may be used on some patients. When a complete evaluation is attempted, an estimate of musculoskeletal abnormalities can be useful diagnostic aid. Appropriate manipulative therapy can be carried out when indicated. No therapy is complete in itself. The competent osteopathic physician should use every weapon which he can lay his hands on to deal with disease. This includes diet, surgery, psychotherapy, medicines, physical medicine, manipulation, everything of value. He should remember that the musculoskeletal lesions associated with other diagnostic and therapeutic criteria make diagnosis and treatment much more accurate.

THE FUTURE FOR OSTEOPATHY

It is interesting to speculate on the development of osteopathic maedicine had it emerged on the medical scene at a different time, in a different environment and when clearer and cooler thinking prevailed in the rest of the profession. The reflex emotional response elicited, in medical circles of that day, at the mere mention of the word osteopathy, is still reflected in some of the prejudices existing in this age, although it is felt that today's prejudice is based primarily on lack of knowledge and therefore misunderstanding of the nature of osteopathic medicine and its aims and desires. The osteopathic profession feels that it has made a very definite contribution to the practice of medicine. It realizes that only a small part of that contribution has yet been made. It realizes that there is much to be proved in its distinctive contribution to medical therapeutics and the role of the somatic component of disease. The challenge that remains is bigger than ever, but until the larger branch of medicine takes interest in helping to scientifically develop this contribution further, the osteopathic profession feels that the best interest of the public and of the science of medicine, is served by remaining a separate and complete school of medicine, co-operating at all times with other agencies sincerely interested in improving the health and welfare of the public.

The osteopathic profession has been adjudged by many medical organizations, in recent years, as a group of highly ethical physicians. Closer co-operation and understanding between the two groups of physicians benefits everyone, especially the patient to whom the physician, regardless of his M.D. or D.O. degree, has dedicated his life.

SUMMARY

An attempt has been made to outline the development of osteopathy from its beginnings to the present day. It could be said that the osteopathic physician is distinguished by a concept of health and disease based on the nature of man, which comprehensively and systematically guides his practice, and by a form of diagnosis and therapy which is an integral part of that practice. The importance of the musculoskeletal system in the total economy of the body, as viewed by the osteopathic profession, has been touched upon, although it is obvious that no great depth could be achieved in a paper of this length. Osteopathic education and licensure has been outlined as it exists today.

ABSTRACT: Fiber Optics; *Narinder S. Kapany:* Scientific American, Nov. 1960.

If light is directed into one end of a glass fiber, it will emerge at the other end. Bundles of such fibers can be used to conduct images over a tortuous path and to transform them in various ways. This article deals with the physical principles involved as well as various potential applications.

One application is in the design of endoscopic instruments. The present rigid type of instrument, e.g., a gastroscope, has several blind spots and its passage causes considerable discomfort to the patient. A fiber bundle will be able to reach every part of the stomach and beyond into the duodenum, and it will be much more tolerable for the patient. Illumination for the "fiberscope" is accomplished by enclosing the instrument in a sheathe of unaligned fibers that conduct light from a bright lamp into the stomach. Many other regions of the body can also be reached. It may even be possible to scan the interior of the heart.

Panectyl

TRIMEPRAZINE

A new
phenothiazine
with three
SPECIFIC indications

PRURITUS
COUGH
DYSPNEA

Presentations

TABLETS, 2.5, 5, 10 mg.

LIQUID, 2.5 mg. per teaspoonful (5 ml.)

AMPOULES, 5 ml.
MULTIDOSE VIALS, 10 ml. containing 5 mg. per ml.

Poulenc
LIMITED, MONTREAL

CHIROPRACTIC

A. E. HOMEWOOD, D. C.
Dean — Canadian Memorial
Chiropractic College.

The rebirth of Hippocrates' rachiotherapy under the name of chiropractic occurred in Davenport, Iowa, in 1895, when a native of Port Perry, Ontario, Daniel David Palmer adjusted the fourth thoracic vertebra of the negro janitor, restoring hearing that had been seriously impaired for some 17 years. D.D. Palmer was not a graduate of one of the finer, or even smaller, universities of his day and thus did not have entree and acceptance into the circles of science and healing. D.D. Palmer was a self-educated man, similar to many of his day who achieved prominence and fame despite their lack of formal education and degrees. Palmer was a grocer and magnetic healer, rather than a "fish peddler" as the critics of chiropractic are prone to aver.

This rediscovery of the Hellenic science and art of vertebral correction, as described and documented by Kleanthes A. Ligeros M.D., Ph.D., in his textbook, *"How Ancient Healing Governs Modern Therapeutics"*, occurred at a time when medical education in North America was in an apathetic state as described by Abraham Flexner in his book "Medical Education", published in 1925, "A third type, (of medical school) already so discredited as to have become absurd, is associated with the New World, where an unprecedentedly rapid expansion of population over an enormous territory created a demand for doctors long before there existed facilities for their proper training or means for their proper support. The inevitable happened. Loose and shifting bands of practising physicians, calling themselves a faculty, tried to impart, chiefly by lectures, to heterogeneous, uneducated groups of students the empirical knowledge — sound and unsound — which they themselves possessed. First and last, American towns have produced over four hundred such medical schools. The teaching of medicine on these terms was, directly, in cash, and indirectly, in prestige, a profitable business". Graduates of chiropractic schools were quick to follow the lead of the elder branch of the healing art, allopathic medicine, and schools sprang up across the country, guilt of all the shortcomings described by Dr. Flexner in his report on medical education, which shook North America and resulted in the philanthropic and governmental endowments of medical colleges, their acceptance into the university fold and their ultimate respectability. Chiropractic, unfortunately did not have Abraham Flexner to stir the very depths of the populace and to loosen the purse strings of governments and philanthrophies. Hence, the reforms made in chiropractic education have come about by the efforts of the practitioners of chiropractic themselves, and to this day no tax dollars are diverted into colleges of chiropractic.

Educational reform in chiropractic was commenced in 1935 under the driving force of John J. Nugent D.C., backed by the National Chiropractic Association. Through the years has evolved a National Council on Education, which gives guidance, assistance and stimulation to educational improvement in the chiropractic colleges and has an accrediting system patterned on the experience and methods of the older professional bodies.

The first doctor of chiropractic came into Canada to settle in Ontario about 1902. Following the First World War, three colleges sprang up in this province, but closed their doors in 1925 or 1926. There followed a 20 year hiatus in Canadian chiropractic education, during which period those desirous of studying this science were forced to cross the border to attend colleges scattered across the U.S.A. On September 18, 1945, the 50th anniversary of the first chiropractic adjustment, the Canadian Memorial Chiropractic College commenced teaching chiropractic to a group of students, 90% of whom were veterans of World War II. From a very modest beginning in the converted Meadonia Hotel at 252 Bloor Street West, opposite Devonshire Place, C.M.C.C. continued to grow, building a three story teaching building to the rear, accomodating chemistry, microscopic, dissection and x-ray laboratories, lecture rooms and auditorium. The old building continues to house the out-patient clinic, administrative offices, library, cafeteria, and dormitory for male students.

Graduates of the C.M.C.C. comprise more than 50% of all practising chiropractors in Canada, are to be found in every province, a number of States, Switzerland, Great Britain, South Africa, Australia, etc. Students are attracted from many foreign countries to attend C.M.C.C.

Upon graduation, licensure examinations must be successfully passed in most provinces and states to secure the legal right to practise. Ontario led the provinces in this form of legislation in 1925, creating a regulatory board which continues to function under the supervision of the Department of Health. Due to the strength and influence of the medical professsion in the Province of Quebec, chiropractic has not been

successful as yet in obtaining legislation for regulation and control of its practitioners, despite thirty years of diligent legislative effort. Such a short-sighted policy leaves the public unprotected from the uneducated, unqualified, unscrupulous individuals claiming to be chiropractors. This is hardly a situation that is defensible as being in the public interest.

Chiropractic has had a stormy career due to the opposition, ridicule and legislative persecution brought to bear against its growth. Despite every effort to eradicate this newly rediscovered branch of generic medicine by those ignorant of the teachings and admonitions of the fathers of medicine, Aesculapius, Hippocrates, Galen, etc., chiropractic has continued to progress, to gain in public acceptance, to receive increased legislative recognition, to be accepted by some five-hundred insurance companies, Workmen's Compensation Boards, athletic teams, industries, and individuals in every walk of life. In fairness, it must be conceded that an element of derision was justly earned by the enthusiasm and often fanatic attitude of a segment of this new profession, who were not satisfied to earn progress, recognition and prestige but felt that tearing down of the older professions was a necessity to advancement.

In Canada the profession has won legislative enactments in six of the ten provinces, with three of the Maritime Provinces boasting too few chiropractors to make legislation necessary. The Federal Government granted a charter for the formation of the Canadian Chiropractic Association, recognized the fees paid to doctors of chiropractic as being income tax deductable, permits donations to the Canadian Memorial Chiropractic College to be exempt from income tax, admits foreign students to study at the C.M.C.C., paid for over two hundred and fifty veterans to study chiropractic at the college, etc. On the provincial front, the Canadian Memorial Chiropractic College has been recognized under the Anatomy Act as a medical college for purposes of sharing the available cadavers for dissection purposes, claims for services rendered injured workmen under the Ontario Workmen's Compensation Board have increased by more than 400% in the past few years, etc. These examples indicate that the profession is receiving attention and recognition by the various levels of government throughout Canada.

D.D. Palmer, the founder of chiropractic, in 1910 published a book, which was a collection of his writings over a period of years, but contains the basic principles of the science and these principles are utilized in the teaching of students here in Canada. Unfortunately, some of the students of Palmer, who founded their own colleges, did not adhere to his basic principles and took only those which suited their purpose and the educational limitations of their students. As a result of this dismemberment of the entire set of principles, various schools of thought sprang up, each emphasizing a varied phase and indoctrinating students with the idea that their concept was the only correct one and their technique of application the only reasonable method. Schisms and sects were the order of the day, a situation from which the profession has not completely escaped.

D.D. Palmer taught that the cause of all disease is irritation (stress), either mechanical, chemical, or mental, which overcomes the natural resistance of the body to produce distortion, interference to normal nerve transmission, functional change, and the tissue changes of pathology. Disease is not something new added, nor taken away, but the response of the body to irritation. Hence it may be appreciated that Palmer was not unmindful of the detrimental effects of pathogenic micro-organisms, the psychosomatic background of many conditions, the ill effects of unsanitary conditions, the adverse influence of faulty diet, the stress of occupation, the irritation of chemicals taken into the body either through the digestive or respiratory systems, and, of course, the evils of mechanical trauma. While it is true that many of the early chiropractors were taught that vertebral distortion was "the cause" of disease, D.D. Palmer had in many areas of his book stressed the diversity of cause, and further, emphasized that the resistance of the individual was governed to a considerable degree by hereditary factors, environmental circumstances, and the previous history of his nervous system. Thus the distortion of the vertebral segments, or other anatomical disrelations, produce varying responses within the individual which may be quite different from those observed in another person with like disrelations, and that the manner in which the victim of a spinal distortion responds varies with the circumstances and his general condition.

Unfortunately for the health of the public, allopathic medicine became enamoured with micro-organisms and viruses and the chiropractic profession lost sight of the basic causes of disease, mechanical, chemical and mental stress. Medicine has devoted much of its energies to a search for new bacteria and viruses upon which to blame each named disease complex, and search for more potent chemicals and antibiotics with which to wage war against these invaders. Chiropractic was content with discovering better methods of locating the structural distortions, causing interference to nerve transmission, and techniques by which to correct

such abnormalities. Both professions lost sight of the importance of the patient, that health does not come merely by taking medicine or structural adjustments, that the individual must obey the laws of Nature to maintain or regain health. Thus the present day patient expects to take his treatment, pay his bill, and be rewarded with health, which he will immediately begin to destroy by the manner in which he continues to live. He does not expect his doctor to insist upon good posture, proper nutrition, exercise, fresh air, correct use of his body and mind at work and at play.

While the attention of the chiropractor of some years ago was directed to proving that the vertebral subluxation caused direct interference to the spinal nerve as it makes its exit through the intervertebral foramen, the present day doctor of chiropractic, backed by the neurological research of the past century has turned his attention to the more subtle influences of the reflex arc and the neural bed of the associated holding elements. Hence the theory of chiropractic is no longer simple and direct nerve pressure but as complicated as the central nervous system itself, with recognition of the fact that the last word cannot be said in the field of explanation for the success of chiropractic technique until the last words have been said in explanation of the complexities of the nervous system. Like allopathic medicine, many reactions within the complex human patient are little understood at the present stage of knowledge and relentless effort must continue to unravel the mysteries.

The increasing mass of factual knowledge, which a student of the healing arts is expected to master, has resulted in the increased length of course required prior to graduation. As mentioned above Abraham Flexner M.D., was responsible for the revolutionary change in medical education, but chiropractic has, of financial necessity, had to be content with evolutionary change. Few people seem to remember that the standard four year course for medical practitioners came into being in the early years of this century and that by 1935 the Province of Ontario had legislation requiring chiropractic practitioners to have the four year course of nine months each conducted in separate calendar years. There seems to be many in this day bent on believing that a doctor of chiropractic has attended a school for some six months at most, and periodically the college receives requests for information relative to correspondence courses from those with little appreciation for the amount of basic science study, laboratory instruction, and clinical experience required to educate a graduate chiropractor.

The prerequisite educational requirement for entrance to the Canadian Memorial Chiropractic College is Ontario Secondary School Honour Graduation, or equivalent. 882 hours of instruction are given in all phases of developmental, gross and microscopic anatomy, as well as both mammalian and human dissection. Inorganic, organic and physiological chemistry occupy another 306 hours. 342 hours are devoted to physiology. Pathology requires 414 hours of lecture and laboratory instruction. Diagnostic instruction requires 702 hours, with an additional 198 hours of x-ray training in all phases from the placement of the patient for each type of exposure, the exposure, development, to the reading of the plates. Further experience is then gained in out-patient clinic in diagnosis, laboratory diagnosis, x-ray examination, and the chiropractic management of the varied cases assigned during the 576 hour required prior to graduation. Bacteriology, Hygiene and public health occupy an additional 270 hours of class and laboratory time. Another 342 hours are required in normal and abnormal psychology, dietetics, first aid, obstetrics and gynecology, with the remaining 792 hours of required time devoted to the principles and techniques of chiropractic. The minimum number of hours of instruction and clinical experience that would permit graduation is 4,342, but most students have well over 5,000 hours prior to graduation.

While most of the subjects studied correspond with those of the medical course, it will be noted that no time is devoted to pharmacology or surgery. The chiropractor does not utilize drugs in his practice nor perform operative surgery. When these are indicated, the patient is referred to a practitioner of medicine. A number of chiropractors do make use of supplemental nutrition, vitamins and minerals, in caring for many of their cases, which is the closest that they come to infringement upon the field of allopathic medicine. Many utilize the instruments of physiotherapy as adjuncts to the correction of structural distortion, and this information is taught as an optional course in the Canadian college. In addition to the usual methods of diagnosis at the disposal of the general practitioner of the healing arts, the chiropractor makes full use of the information provided by the spinal subluxations as determined by palpation, full spine x-ray invesgation and instruments which aid in locating nerve interference to aid in establishing the viscus involved by such nerve involvment. The doctor of chiropractic must have an efficient working knowledge of the distribution of the nerve fibres for both diagnostic and treatment purposes, since his entire concept hinges

upon the importance of the nervous system in the control of function in both health and disease. The patient is examined with a view to determining not only the named symptom complex but also the structural disrelation causing the disturbance to the nervous system with the subsequent alterations in function and tissue changes of pathology. Here lies the basic difference between the practice of allopathic medicine and chiropractic. The allopathic practitioner will concern himself with prescribing a drug to counteract the associated micro-organisms, stimulate the function retarded, or inhibit the function exhibiting excess. The chiropractor would attempt to adjust the structure to remove interference with normal nerve transmission with the expectation that the body alone has the innate knowledge of how to heal and restore normal function. He is not concerned, therefore, with attempting to stimulate or inhibit, but rather normalize. To do a thorough service for his patient, the chiropractor should attempt to determine the background cause of the structural distortion and have such cause, or causes, eradicated. The chiropractor appreciated that not every case will respond to his particular approach and that there are those cases that must be referred on to the surgeon, the dentist, the occulist, etc. Further there may be a need to utilize the antibiotics in some cases of infection, insulin for the diabetic, morphine for severe pain, thus the allopathic physician is called and the patient referred. The chiropractor is very conscious of the fact that he does not have the panacea for all ills.

While the chiropractor has earned particular recognition in the field of somatic disorders, such as the lumbar spinal problems, neuritis, sciatica, etc., ever increasing numbers of the population are appreciating the fact that the chiropractor has a general health service to render that is efficacious in the greater percentage of conditions. Thus many families depend upon him for care of all conditions, leaving the decision of when to be referred to other members of the healing arts to his judgement. Expectant mothers and obstetricians are often surprised at the ease with which delivery is effected when the mother has received chiropractic care during the pregnancy, making the necessary corrections incidental to the stress of unusual weight distribution, assuring proper elimination and nutritional intake. Children respond readily to the techniques of the chiropractor and are guarded against the ill effects of structural distortion occasioned by falls, as well as being guided in the development of correct posture. Chiropractic is concerned with the patient who has the disease, rather than the disease that has the patient. In other words, if assistance is rendered to a sick body and it has the power within to effect healing, chiropractic can be effective. In the event that the pathology is irreversible, or the patient does not have the vitality to respond, then surgery or other methods may be necessitated. Some of the claims being made for the effectiveness of chiropractic by German and other European medical doctors would make the average chiropractor blush. Many of these investigators have been quoted in a recently published book, *"Medicine and Chiropractic"* by C.W. Weiant and S. Goldschmidt.

This profession appreciates the other healing arts, their efforts in the interest of sick people, their devotion and diligence and does not seek to supplant or derogate, but rather supplement, with a different point of view and a characteristic therapeutic armamentarium, the effort being made to promote good health and restore the sick. It is recognized that the pooling of all of the knowledge of allopathic medicine, homeopathic medicine, chiropractic, osteopathy, naturopathy and the divine healers would result in gaps in the understanding of how the human body functions in health and disease and that not all sick persons could even then be cured. Chiropractic seeks to serve the sick with its specialized methods and to enjoy the dignity, prestige and privileges accorded the professions. Further, it would seem to have earned the right to expect the use of public facilities in the interest of that segment of the public seeking health through its methods, and to receive government and philantropic support for the research required and not being done in the so-called "orthodox" institutions by those schooled in allopathic philosophy. Much more is to be done in the understanding of how body structure influences function.

Most older practitioners of chiropractic were attracted into the profession because of personal, or family, experiences of cures effected after other methods had failed. The writer was planning a medical career when a resistant bronchial condition resulted in his being forced by parents to consult a chiropractor. A very competent and highly respected medical practitioner has treated the condition unsuccessfully for some four months with little, or no improvement. Against my desire and will, the chiropractor effected marked improvement after the first visit. Further visits not only completely cleared the problem, but kindled the light of interest in this young profession and resulted in a complete change of plans for my life. Many of the present students are coming to college because of similar experiences, but a growing proportion enter college because chiropractic has become an accepted

part of the social order and it offers opportunities in an uncrowded field of public service.

With the increased depth of educational attainment and the prestige and acceptance enjoyed the chiropractor no longer suffers from an inferiority complex, expressed in fanaticism and the need to speak in derogatory terms of physicians. A closer harmonious and co-operative spirit is seen to be developing year by year between the chiropractic and medical professions in the interest of public health. The medical practitioner is gradually recognizing that the chiropractor is indeed educated in the healing arts and is sincerely and conscientiously attempting to get sick people well, rather than being some type of "quack" deliberately taking advantage of the gullible members of the populace. No matter how violently each profession may disagree with the methods used by the other, mutual respect is developing. The growing interest being shown by medicine in the manipulative art as indicated by numerous articles in medical journals and reports from patients of being manipulated by medical doctors causes some concern to the chiropractic profession. Medicine, for many years, heaped ridicule upon the heads of those practising the adjustive art and now seem intent upon taking over this phase of therapeutics. History indicates that such would not be in the interest of the public. Hippocrates, the father of medicine, attempted to stress the importance of the spine but the manipulative art fell into disuse by physicians. Homeopathy was accepted into the fold of allopathic medicine but is now almost extinct in North America. The osteopaths sought and found favour with allopathic medicine at the expense of the manipulative art. Hence, to have chiropractic accepted into the orthodox fold, to become part of medicine, or to be given the privileges of practising general medicine as well as manipulation, would lead to the loss of this art. There is room in the healing arts for a number of schools of thought, each with its own particular philosophy and mode of practice, its own interests in research and development. Competition of a friendly nature is good for professions as well as for businesses and is in the interest of the general public. Were a single school of healing to exist, the sick would be the losers, and the incentive for progress would be seriously dulled.

The doctor of chiropractic recognizes that he is a general practitioner of one particular mode of practice and appreciates the assistance of the many specialists of medicine who by education, experience and special facilities are capable of rendering important aid in many problem conditions, both diagnostically and treatment-wise. Despite his more extended training in x-ray, the chiropractor does not boast of being a radiologist and often seeks the opinion and the services of the medical specialist in this field. Co-operation and understanding between the two largest of the healing arts must continue to develop, if the best interests of the general public are to be served.

The majority of the members of both professions are dedicated to the task of relieving human suffering and as a natural result of their interest in the welfare of patients have been swinging gradually to a more co-operative attitude toward practitioners of the other school of practice. As the practitioners of medicine learn more of the educational background of the chiropractor and see more of the results of his form of health care, bias and intolerance will give way to a more friendly, co-operative attitude. Certainly, the M.D. has had less opportunity to learn of chiropractic education, rationale, and methods than has the chiropractor to learn of medicine. Little effort has been made by the chiropractic profession to bring to the attention of the medical profession developments in education, techniques of diagnosis and treatment, or to develop a friendly relationship between the two organizations. Contentment has been derived from continuing to practise quietly on the home front, secure favourable regulatory legislation, and gradually cultivate the understanding and tolerance of the local M.D's.

It is indeed a forward step, and one to be commended, that the Editor of a Medical Journal should provide the opportunity for a lengthy article by a chiropractor to assist in bringing more light upon a subject of interest and obscurity. Perhaps from this coverage of the generalities further interest and investigation may come with an appreciation of the second largest of the healing arts, that the years of practice ahead may see co-operative effort of medical and chiropractic practitioners in the interest of the sick and suffering.

• • •

So much for the generalities, history and differences of chiropractic as compared with allopathic medicine. Now, in some two thousand words, a taste of the neurological basis for chiropractic is to be presented, which can be little more than a gentle scratch of the surface. During the past sixty-five years, the chiropractic profession has been preaching the importance of the nervous system in health and disease and the adverse influence structural distortion, especially of the vertebral column, exercises upon the nervous system, hence the role played by such anatomical disrelations in the various processes

called disease. During this same period of time the allopathic medical school of thought has been busily engaged in pursuit of micro-organisms and filterable viruses with better, more efficacious "wonder drugs", while denying the allegations of chiropractic and shouting, "Quacks". While the battle raged between the two professions on the outside, the pure scientists, cloistered in their ivory towers, were busily engaged in unravelling the mysteries of the nervous system and writing textbooks. The information, accumulated by the "orthodox", now provides the basis for argument by the "unorthodox", the chiropractors. It cannot be denied that the chiropractic profession is dependent in no small measure upon the findings of those who owe allegiance to the older school of medical thought and has been able to contribute little to the general body of scientific knowledge, but has had to be content with contributing to the clinical application of its principles and devising better methods of restoring health to those seeking aid at the hands of its practitioners. Hence the authorities quoted in the following paragraphs will be names familiar to medicine.

Chiropractic has not been content to care for the somatic problems, such as low back strain, sciatica, brachial neuritis, etc., but indeed established itself as a major healing art and science by caring for, and curing, many of the diseases resistant to allopathic medicine, during those days when the chiropractor did not know there was such a thing as an irreversible pathology. Friemut Biedermann, M.D., a Stuttgart surgeon, now practising chiropractic, in his book, *The Foundation of Chiropractic from the Standpoint of the Physician,* lists the conditions for which he has found this new science and art a potent therapeutic weapon. This lists is lengthy and causes the modern chiropractor, with his 430-odd hours of pathological studies, to blush. Some of the conditions listed are:— arteritis obliterans, asthma, cardiac anomalies, colitis, constipation, hemorrhoids, impotence, intermittent claudication, menstrual disturbances, tetany, toothache, urethritis, gall-bladder colic, renal colic, paroxysmal vomiting, allergic manifestations, etc., etc.

From the writing of such men as Dr. Parsons of Red Deer, Alberta, in the medical journals and in textbooks such as Mennell's, Hadley's, etc., it seems that minor disrelationships of the vertebral segments have been accepted by medicine as realities and, therefore, require no elaborate discussion to convince the reader of this article that such do occur, as contended by the chiropractic and osteopathic professions. These vertebral disrelations have been called by the chiropractic profession, "subluxations" and by the osteopathic profession, "lesions". The term, which might best express the condition which exists in the common segmental disrelationship of the spine, would be, "Fixation", since the vertebra is not in a state of partial luxation, but fixed within its normal range of motion and not capable of taking part in the normal range of compensatory movement required of a normal vertebral column, nor of moving freely in accordance with the volitional demands of the individual. The cause of such a condition, according to D.D. Palmer, the founder of chiropractic, is mechanical, chemical, or mental irritation of sufficient magnitude to overcome the normal resistance of the body, produce postvertebral muscular contraction which causes the vertebra to be held in a state of relative disrelation with the adjacent segments for the varied positions assumed. These "distortions" may be detected by careful measurement of the segments in a roentgenogram, or by comparison of two x-ray visualizations taken with the patient in different positions of motion.

To illustrate the mechanisms involved both in the production of the subluxation and the symptoms and tissue changes which may follow, it would be best to utilize a concrete example and for this purpose a mechanical strain of the intervertebral articulation on the right side between the sixth and seventh thoracic vertebrae will be assumed. With the sudden strain and injury to the holding elements of this area, afferent impulses will begin passing into the spinal cord segment through the sixth thoracic nerve trunk, through the posterior nerve root, to the unipolar cytones in the posterior nerve root ganglion, then over the axones of these cells into the cord, the fibres conveying impulses of pain ascend for several segments in the Posterolateral Tract of Lissauer to synapse with the cytones of the second order neurones in the Substantia Gelatinosa of Rolando, from this point the axones pass forward and medially to decussate as part of the Anterior White Commissure, turn up to become part of the Lateral Spinothalamic Tract, reach the thalamus, synapse with the third order neurones which conduct the impulses to the appropriate portion of the Postcentral Gyrus of the cerebral cortex to be appreciated as localized pain. At the same time, impulses have travelled over collaterals of the first order neurones into the grey matter of the sixth thoracic neuromere to make synaptic connection with connector neurones which stimulate the anterior horn cells to send impulses out over the anterior nerve root fibres, through the nerve trunk, through the posterior primary ramus to the postvertebral muscles to cause the "splinting", in accordance with Pflueger's Law and Hilton's Law. Both

Pflueger and Sherrington have pointed out that the greatest contraction will occur on the side of stimulation, while Hilton explained that the nerve that supplies an articulation also supplies the muscles which move that articulation.

Not only are the anterior horn cells involved but also the lateral horn cells which are the cytones of the preganglionic sympathetic neurones, thereby modifying the supply to the vascular bed of the muscles and skin of the segment supplied. Best and Taylor, and other physiologists, have shown that active muscle requires 20 to 30 times the oxygen necessary for resting muscle and this can be obtained only by vasodilatation. With this increased concentration of blood in the area, the sensitive thermo-couple can detect differences of temperature on the two sides of the spinous process, a method used in chiropractic to determine the segment of the spine involved. Further, this disturbance of the sympathetic neurones results in an increased activity of the suderiferous glands of the dermatome and is detectable by special instruments, which measure the electrical conduction of the skin.

While these somatic changes are being effected, the viscera are being involved and the stomach is arbitrarily chosen for this illustration. The physiologists and neurologists have established that with dilatation of blood vessels of the somatic structures a concomitant vasoconstriction occurs in the gastro-intestinal tract. In this instance the stomach, being supplied by the sixth to the nineth thoracic neuromeres, may show an area of vasoconstriction, inhibition of the normal secretory activity, etc. As Albert Kuntz has discussed in *The Autonomic Nervous System,* vasoconstriction results in leukopenia and a lowering of the resistance of the tissue, thus in the instance here discussed the involved portion of the gastric mucosa may well be more susceptible to the invasion of viruses or micro-organisms and less resistant to the gastric juices. A resultant ulceration may then occur.

The chiropractor is not unmindful of the many and varied factors which may modify the response of the individual nervous system to the irritation of a vertebral subluxation, nor does he make the claim that every individual with a subluxation of the sixth thoracic spinal segment would have a gastric ulcer, but would expect that the great majority of patients with gastric ulcer would have a subluxation within the area of the sixth to the ninth thoracic nerve. H. Kamieth reporting in an article entitled *Pathogenetic Importance of the Thoracic Portion of the Vertebral Column* from Munich, Germany, states that 86% of cases with proven peptic ulcers showed, by X-Ray investigation, scolioses in the appropriate thoracic area of the spine. While the illustration has treated the subluxation as though it caused its ill effects through one segment of the spinal cord only, Sherrington has made it abundantly clear that the reflex response to afferent stimulation is plurisegmental, thus the "splinting" response is likely to involve muscles that are derived from a number of myotomes in their development and hence are supplied by a number of neuromeres, and become reflexly involved even were a strain confined to one intervertebral articulation, hence the formation of scoliosis.

Further, the chiropractor is not unmindful of the multitude of modifying factors that may alter the response of the nervous system to a particular subluxation. The history of particular pathways within the spinal cord may predispose one individual to a response such as discussed above, while another person may show the detrimental influence in an entirely different organ which receives sympathetic supply via preganglionic fibres of the same segment. The irritability of the spinal cord segment has a modifying influence and in turn this irritability varies with fatigue, toxicity, emotional influences, oxygenation, other sources of stimulation entering the same neuromere, etc. The tissues at the terminal endings of the nerve fibres react in accordance with the conditions present both within their cells and their environment. Cells high in calcium content react more strongly to sympathetic stimulation, while those high in potassium resist the influence of sympathetic stimulation. Hormones, also, have very pronounced regulatory influences, thereby regulating the response to neurological stimulation.

The illustration above has been relatively simple and merely serves to indicate a principle and a mechanism. The explanations for the disturbances of cranial nerves by vertebral subluxation, or fixation, becomes much more involved but does follow neurological information and investigation. These discussions of the nervous system are not entered into with the average patient interested in the mechanism by which the chiropractor explains the cause of his condition. Rather the chiropractor is likely to take a vertebral column in hand, torque a vertebra out of relationship, point out the narrowing of the intervertebral foramen, and indicate the disturbance such a condition would produce in a sensitive nerve passing through the opening. The patient is satisfied but the chiropractor is fully aware that such an explanation would not suffice for men of science. Unfortunately, it is this layman explanation that seems to have reached the ears of the men of science and resulted in accusations that chiropractic is a cult, with a one cause, one cure idea. It is hoped

DOCTOR:

This case of S-M-A is for YOUR baby . . . and we'll send *as many more* as your baby will require.

Sincerely,
Your Wyeth Representative

S-M-A PHYSICIANS' SERVICE

S-M-A is available to physicians, internes and senior medical students—without charge — for the feeding of their own infants. We would like you to observe the superiority of the S-M-A formula in the nutrition of the most important infant in the whole world — your baby.

Thousands of doctors across Canada have taken advantage of this service through the years—years that have brought constant improvement in the S-M-A formula. Today, S-M-A contains all the elements necessary to produce nutritional results surpassed only by mother's milk.

Simply contact your Wyeth Representative or write direct to

Sales Service Department JOHN WYETH & BROTHER (CANADA) LIMITED Walkerville, Ontario

Sound Infant Nutrition **S-M-A** FOOD FORMULA FOR INFANTS

Wyeth
Registered Trademark
WALKERVILLE, ONTARIO

that the reader appreciates that chiropractors recognize that any form of mechanical, chemical, or mental irritation may produce the subluxation and that this disrelation adds to the problem and may be a determining factor in the site of symptom manifestation. The chiropractor is quite unabashed in maintaining that the vertebral column is the cross-roads of the nervous system and plays an important role in the symptom complex of most, if not all, disease processes. This does not indicate that he does not appreciate the importance of the other practitioners of the healing arts and does not realize the need for collaboration between the professions in the correction of many health problems.

From this article it is hoped that a little more understanding and respect may accrue and that co-operation in the interest of suffering humanity may be the end product.

CHRISTIAN SCIENCE

LESLIE A. TUFTS
Christian Science Committee
on Publication for Ontario.

Christian Science is a religion which was founded in 1879 in the United States. There are now approximately 3,300 churches of this denomination in 45 countries and some 230 affiliated student organizations at colleges and universities.

Christian Science is a Christian denomination. Its adherents accept Christ Jesus as Master and Saviour and the inspired word of the Bible as their guide. Although the concept of religious healing is basic to Christian Science, its adherents do not consider their religion to be simply a substitute for medical or orthodox means of healing. Healing of the sick is not the most important part of Christian Science and is only one aspect of a unified and comprehensive theology.

All Christian Science thinking starts with God, as revealed in the Bible and further defined in *Science and Health with Key to the Scriptures* by Mary Baker Eddy, the discoverer and founder of Christian Science. The definition of God to be found on page 465 of the latter book reads: "God is incorporeal, divine, supreme, infinite Mind, Spirit, Soul, Principle, Life, Truth, Love". These terms are synonymous, Mrs. Eddy notes, and are "intended to express the nature, essence, and wholeness of Deity".

This nature and essence is understood in Christian Science to be totally good. Consequently Christian Scientists hold it to be impossible that God should create, permit, or express Himself through that which is not good or through anything unlike His own nature as infinite Spirit and Love; therefore He is not manifested pantheistically in the so-called natural, material world. To attribute the evil of human experience even indirectly to an omnipotent and all-wise intelligence seems to be the Christian Scientist to dishonor God. With Habakkuk he says, "Thou art of purer eyes than to behold evil and canst not look on iniquity (Hab. 1:13), with John, "God is light, and in him is no darkness at all" (I John 1:15), and with James, "Every good gift and every perfect gift is from above, and cometh down from the Father of lights, with whom is no variableness, neither shadow of turning" (James 1:17).

From this teaching it logically follows that man in his true spiritual nature, as Christ Jesus revealed him, must be as perfect as his heavenly Father is perfect. This is far from evident to the physical senses, but Christian Science teaches that all experience is basically mental and that the physical senses are the representatives of a false kind of thinking, of what Paul calls the carnal or fleshly mind. The overcoming of all forms of evil therefore becomes a matter of exchanging the false concepts of the carnal mind for the true and demonstrable evidence of the divine Mind or God.

Christian Science is therefore more than a system of belief. It is an unending spiritual discipline and a concrete way of life. While it teaches that God is not manifested in the materiality, mortality, and imperfection of the universe as it appears to the senses, neither is He suspended in the thin air of metaphysical theory. Christianity, it holds, was originally the most practical of idealisms. Jesus' disciples were expected to be able to go forth and heal, for their Master promised, "He that believeth on me, the works that I do shall he do also" (John 14:12).

Christian Scientists understand this promise to extend to his disciples of all time. They regard the healing works of Jesus and his early followers not as the effect of some personal charisma or as miraculous infractions of the laws of nature but as the natural result of understanding the higher laws of Spirit. Healing, in this light, becomes a freeing from the limitations and distortions of material thinking, in accord with Jesus' statement, "Ye shall know the truth, and the truth shall make you free" (John 8:32). Health is far more than the absence of sickness, and is a broad term indicating the fulfillment of man's relationship to God.

It is difficult for some who are not closely associated with the continual healing work of Christian Science to conquer their skepticism toward what seems to them their neighbors' credulity in accepting the improvement of every phase of human existence, including bodily health, as a natural consequence of learning more about God. It is sometimes assumed that Christian Science is effective only in cases of functional disturbance, in psychosomatic illness, or where unrecognized psychodynamic factors are at work. It has, however, been the experience of multitudes of rational, well-educated people in the past ninety years that prayer as taught and practised in Christian Science constitutes a highly effective, reliable method of healing.

The Christian Science Journal and Christian Science Sentinel, monthly and weekly church publications, have for many years contained unsolicited, verified testimonies of healing of a wide variety of serious conditions, including inoperable cancer, tuberculosis at an advanced stage, arthritis, heart disease, broken bones, diabetes, blindness, and many others. Frequently, these conditions have been diagnosed by competent medical authority using modern procedures generally accepted as reliable — X-ray, biopsies, and so forth. Some of these healings occur in cases with a long medical history of hospitalization and unsuccessful orthodox treatment.

Ordinarily neither the written testimonies not the oral testimonies given in Christian Science hurches go into detail on these aspects of a case. Their purpose is not to prove a hypothesis but to express the gratitude and joy of what has been for the testifier a spiritually regenerating as well as a physically liberating experience. It should be emphasized, however, that investigation of such cases frequently discloses supporting evidence impressive by any standards. An interesting discussion of this point may be found on pages 141-160 and in Appendix B of *Christian Science: Its Encounter with American Culture* by Robert Peel (New York: Holt, Rinehart & Winston, 1958).

Christian Scientists do not oppose other systems of healing for those who are not Christian Scientists. Where medical examination or treatment has been made compulsory by the law of the land, they are obedient to the law while asking for legal recognition of their right to practise the healing which is part of their worship of God. They are also conscious of their obligation to respect their neighbors' beliefs and are careful to report to the proper authorities the suspected presence of contagious diseases and to observe quarantine regulations, even though in these cases they rely on Christian Science treatment for the healing itself.

In recent years many of the traditional Christian faiths have been exploring possible areas of co-operation between religious, medical, and psychological modes of healing. It is sometimes asked why Christian Science takes the position of depending upon spiritual means alone. At least a partial answer to this should be apparent from the foregoing explanation. Healing in Christian Science is an integral part of a religious view, and is based on a wholly different premise from that of the various faith-healing movements. While Christian Scientists deeply respect the sincerity and humanitarian concern of all who are engaged in the effort to improve mankind's lot, they have found that an attempt to combine Christian Science with other methods of healing ordinarily lessens the effectiveness of both systems.

Exceptions occur in regard to obstetrics, dentistry, and sometimes in the setting of bones, where the medical services are of a more mechanical nature and do not involve drug therapy. In cases of childbirth, it is understood that Christian Scientists will call upon a physician or midwife for the delivery. In cases of fractured bones, they may or may not prefer to have a physician set the bone, but whether or not this is done a Christian Science practitioner may properly give Christian Science treatment for the rapid and perfect knitting of the bone. In emergency cases where a patient is taken to a hospital — for instance, after a street accident — and wishes Christian Science treatment, it is expected that a Christian Science practitioner will be called in accordance with his request, since the choice of the method of treatment he will have is a matter of individual right.

Where a Christian Scientist delberately chooses to go to a doctor or to a hospital for treatment, he is obviously free to do so like any other citizen, but in this instance a Christian Science practitioner will normally relinquish his

case. Sometimes a Christian Scientist will come to a doctor at the urging of his family or friends and this may result in his taking a wavering or inconsistent attitude which may puzzle the physician; in such an event the patient may be helped to see that he must decide definitely for one sort of treatment or the other. But in the vast majority of cases Christian Scientists, having found their religion reliable and effective in all sorts of physical healing, naturally prefer to rely on it alone and do not willingly turn to any other remedial means.

Where their own faith and understanding do not seem adequate to bring healing, they can always call upon a Christian Science practitioner, one of the nearly 10,000 individuals listed in the Christian Science Journal who have met the requirements of The Mother Church, The First Church of Christ, Scientist, in Boston, Massachusetts, for engaging in the full-time public practice of Christian Science healing. The Journal also includes a list of Christian Science nurses who have been thoroughly trained to administer practical nursing care in cases of severe or protracted illness. This care does not, of course, include medication or physical treatment. The church also maintains two sanatoriums and gives its approval tc a number of privately operated nursing homes which meet required standards and provide care in accord with the beliefs of those relying upon Christian Science for healing.

THE PRESENT STATUS OF HYPNOSIS

THOMAS R. VERNY, 6T1.

Although the modern era of hypnosis dates from Mesmer, it is well known that hypnosis, under various labels, had been used for thousands of years previous to the time of this Viennese physician. We also know that interest in hypnosis has waxed and waned several times in medical history. To-day, another dormant period is passing. Many medical men are again considering the potentialities of this technic. This present renaissance of medical interest is by no means fortuitous. It arises naturally out of the advancing knowledge of psychosomatic medicine and the increasing appreciation of the importance of psychologic factors in the maintenance of health.

THEORETICAL ASPECTS

Psychodynamically-orientated psychiatrists usually refer to Hypnosis as a transference experience in which the subject abandons his executive control and reaches a more or less regressed, dissociated state which is actively instigated and knowingly enhanced by the hypnotist. Transference, in this case, is defined as a state of relatedness characterized by an irrational submission of the subject. Spiegel sees the trance phenomenon as a three stage operation with considerable overlapping.

1. *Aura* — elicits whatever transference potential is present in the subject.
2. *Stage of Psychophysiological enhancement* — Here, the art of induction consists of indicating in advance the known and predictable physiological phenomena which occurs with the instructed position, and tacitly implying that the phenomena are due to the art of the hypnotist. In addition, repetitions and fatigue accentuate the effect.
3. *The "Plunge"* — Abandonment of executive controls and irrational submission into a dissociated state take place.

During the first two phases the hypnotic induction process may contain rational and conscious components on the part of the patient. But this is merely preparatory for the gradual emergence of the irrationaly modality.

Psychophysiologically, the hypnotic state is interpreted as a controlled dissociated state. This state of altered awareness is maintained through "parassociative" mechanisms mediated by the ascending reticular activating system. These mechanisms probably involve the thalmocortical projection system and the corticofugal system.

When there occurs a marked narrowing of focus of awareness on a particular aspect of reality to the exclusion of much of the rest (as in the initiation of the hypnotic trance) then verbal suggestions taken in through an open channel (*rapport*) became effective because they are not subjected to ordinary reality testing. The hypnotist's remarks are accepted as reality to a greater or lesser extent, depending on the subject's dissociation of other information from awareness.

Hypnosis may be induced either by the gentle, monotonous, object focussed technic, or, the emotion laden, high stimulus-input stage technic. The first is near the hypnagogic point with a low level of arousal but an even lower level of effective input; the second is near the point of spontaneous dissociative phenomena under conditions of great arousal and impaired effective input which is literally "jamming the circuits". Between these two extremes deliberate exclusion of external stimuli may be achieved though intense concentration. Probably, it is in this way that the trained subject quickly enters the trance state on receiving his previously defined signal from the hypnotist.

METHODS OF INDUCTION

All utilize ideomotor and ideosensory conditioning. The former refers to the production of muscular actions; the latter, to the development of sensory images.

Direct Methods: (authoritarian) These depend on eye fixation with resultant fatigue and relaxation of various muscle groups, first small then large. Utilization of ideomotor and ideosensory activities is as follows: "If you really wish to become more and more relaxed, just stare at the ceiling and you will notice that your eyelids are getting very, very heavy (ideosensory) indicating that you wish to close your eyes (ideomotor)".

Indirect Methods: (permissive) These stress visual sensory imagery; for example, in children because of their vivid imagination a TV or motion picture screen is imagined in the mind's eye and then utilized for hallucinated material e.g., "Close your eyes and relax comfortably. That's fine. Relax all over. If you will please imagine the most comfortable chair in the world. Do you see it? (Pause and obtain response). Soon it will be occupied by another person. Describe the person to me. (Wait for response). Would you be willing to help me teach "X" (person described by subject) how to go into hypnosis"? As the patient responds to those suggestions ostensibly made to the hallucinated person, the shift is gradually made from "X" to the patient, until hypnosis has been accomplished.

Mechanical Methods: These employ repetitive visual, auditory, or tactile stimuli produced by any one of a number of devices such as a metronome, whirling discs and electronic instruments which rhythmically emit flashes with or without verbalization techniques.

All therapists must be capable of switching from one approach to another, even during the same induction. Generally speaking, passive persons respond to authoritarian technics while domineering personalities do better under more permissive technics. Persons insusceptible to either of these technics frequently may be hypnotized by mechanical means.

Methods of Deepening the Hypnosis

By establishing a definite goal for each step of the induction procedure the patient may be smoothly brought to progressively deeper states of dissociation. For example, "As you raise your arm higher and higher, with every upward motion of your arms, you will become more and more relaxed".

A medium depth of hypnosis is indicated by ease of lid closure, inability to open eyes after closure, trembling and twitching of the eyelids and a moderate degree of muscular relaxation and limb catalepsy.

The deep hypnotic state is characterized by staring eyes, immobility of the facial muscles, loss of startle reflex, slurring of speech, a time lag between the giving of and the response to a suggestion, economy of motion and catalepsy of large muscle groups.

Conditions for Successful Hypnosis

Generally speaking, intelligent persons who can concentrate and who are highly motivated make the best hypnotic subjects. Exhibitionists are, with the exception of those who use resistance as an attention getting device, easy to hypnotize. On the other hand, imbeciles, morons and psychotics are difficult, if not impossible, to hypnotize. Psychoneurotics often pose a problem in hypnosis because they resist the relinquishment of symptoms which serve a definite need in their psychological make-up. Hypnosis can be induced in persons from about the age of six to old age.

Misconceptions on the part of the patient to the effect that he will become unconscious, surrender his will because of "weak-mindedness", fail to wake up, or babble and reveal shameful secrets, must be removed. Subjects should be informed that they cannot be made to violate their moral codes and that suggestions contrary to their wishes usually will not be followed.

Before inducing hypnosis it is advisable to tell the subject what he is to expect and what is expected of him. If he follows elementary instructions he will automatically follow other more complex ones and enter deeper states of hypnosis at his pace and desire. When possible, it is generally helpful to have a new patient observe an induction procedure in a well-conditioned patient since here, as most anywhere, a few minutes of observation are worth hours of discussion.

Thus, it can be readily seen that hypnotic induction can be easily learned as the technic

for a lumbar puncture. The real problem is what to do with the patient after that.

The Perils of Hypnosis

Psychodynamically oriented psychiatrists hold that the emotional or mental symptom represents a defense reaction of the patient against anxiety which in turn is the resultant of unconscious unresolved conflicts. Such symptoms to the mentally disturbed patient, like the crutch to a physical cripple are unsightly and uncomfortable but necessary for the individual's functioning. Removing the symptoms by hypnosis without understanding or treating the underlying conflicts may momentarily give a superficial impression of a dramatic cure but may prove disasterous from the point of view of the total situation. Left defenseless, the patient may develop severe anxiety, depression, suicidal preoccupation, or may even excape into the schizophrenic refuge of irrationality.

Further, whenever patients request hypnosis, their motivation for this and their reasons for requesting it need evaluation. Therefore, it is just as important to know how to hypnotize as to know when not to hypnotize. We should at all times remember that this can be a dangerous technic when used for the uncovering of repressed material in order to pinpoint causes of the patient's present ill health. No physician should indulge in mental surgery only to lay bare mental disease, just as no cardiologist would undertake intrathoracic surgery merely to ascertain the cause of the patient's heart murmur.

APPLICATIONS

I. *Research Technic*
   (1) To find out what hypnosis really consists of,
   (2) To probe the unconscious,
   (3) To determine experimentally just how much so-called psychological factors affect the physiology of the individual.

II. *Diagnostic Method*
   (1) To aid in differentiating organic and functional diseases,
   (2) To help in eliciting the underlying cause of the patient's illness.

III. *Therapy*
   (1) Symptomatic treatment e.g., for dumping syndrome,
   (2) To alleviate or prevent painful conditions associated with diseases or certain procedures, such as analgesia in obstetrics,
   (3) To maintain morale e.g., in chronic illness,
   (4) Hypnoanalysis to speed up psychoanalysis.

EXPERIMENTAL ASPECTS

Barker and Burgwin studied EEG patterns during hypnosis, hypnotic sleep and normal sleep. They found no marked dissimilarities in patterns between patients in the waking state and hypnotic trance. On the other hand, when deep sleep was produced through hypnotic suggestion, the tracings were identical with those obtained during normal sleep.

Considerable work has been done on the changes in the EEG during hypnotic age regression in patients showing abnormal tracings. Kupper found that in hypnotic age regression, the EEG of an epileptic patient changed from an "abnormal" to a "normal" record when the patient was regressed to a period in his life antedating the development of epilepsy. It is now well established that changes in affect are capable of producing alterations in the EEG recordings of epileptic patients. Barker was able not only to elicit abnormal EEG patterns in epileptic patients by recall of charged experiences but also to induce convulsive disorders. These studies support the view that certain convulsions are psychologically influenced and may reflect a need for the discharge of intense affect associated with emotional conflict.

Messel and Ledford regressed two patients with primary *grand mal* seizures to a time antedating the development of convulsions. Both patients had abnormal waking EEG's as did the "control" subject who had no history of a convulsive disorder. During hypnotic age regression these EEG's as well as the EEG of the "control" showed no changes. The True Age Regression Test and plantar response (dorsiflexion in infancy) during regression to infancy as measures of the validity of regression, were equivocal at best. Signatures obtained at various ages reflected increasingly child-like patterns.

Several Swiss scientists have done thorough experimental studies on the physiology of the hypnotic state and turned up some interesting results.

Muscle Pontentials: Electromyograms were connected to the upper and lower arm and the results correlated with the patient's subjective symptoms. It was found that although the muscle potential dropped as the hypnotic state was reached, this was not a specific response to hypnosis for it could also occur during the waking state if the patient consciously relaxed his muscles.

Skin Temperature: Many patients report during hypnosis that their hands feel warmer than usual. For purposes of the experiment the temperature

oral CHLOROMYCETIN Kapseals*—the opaque white capsules with grey band—for unvarying potency, purity, and efficacy from dose to dose • CHLOROMYCETIN Palmitate—for children and adults who prefer a liquid medication—an easy-to-give, easy-to-take custard-flavoured suspension. **parenteral** CHLOROMYCETIN Succinate—so versatile it can be given intramuscularly, intravenously, or subcutaneously.

CHLOROMY

ophthalmic CHLOROMYCETIN Ophthalmic Ointment and CHLOROMYCETIN Ophthalmic Solution for notable efficacy...ready penetration into ocular tissues. **topical** CHLOROMYCETIN Cream, 1% for rapid clearing of superficial skin infections and surgical wound infections • CHLOROMYCETIN Topical, 10% solution, for excellent results in infections of grafts, surface infections, and varicose ulcers.

Since its introduction early in 1949, the unusually broad range of antibacterial action of CHLOROMYCETIN, its purity, outstanding tissue diffusibility, and low incidence of gastrointestinal side effects have combined to make this Parke-Davis antibiotic an agent of choice throughout the years[1-14] in a wide variety of systemic and localized infections.

The numerous dosage forms of CHLOROMYCETIN—designed to meet virtually every type of clinical application—offer the physician the added convenience of flexibility of dosage and administration according to the requirements of the patient.

CETIN* AN APPROPRIATE DOSAGE FORM FOR EVERY TYPE OF CLINICAL APPLICATION

(chloramphenicol, Parke-Davis)

Chloramphenicol is a potent therapeutic agent and, because certain blood dyscrasias have been associated with its administration, it should not be used indiscriminately or for minor infections. Furthermore, as with certain other drugs, adequate blood studies should be made when the patient requires prolonged or intermittent therapy. Medical literature available on request.

References: (1) Ehrlich, J., *et al.: Science* **106**:417, 1947. (2) Woodward, T. E., *et al.: Ann. Int. Med.* **29**:131, 1948. (3) Smadel, J. E.: *Am. J. Med.* **7**:671, 1949. (4) Parker, R. T., *et al.: J.A.M.A.* **143**:7, 1950. (5) Lewis, R. S., & Gray, J. D.: *Brit. M. J.* **2**:939, 1951. (6) Trice, E. R., & Shafer, J. C.: *J.A.M.A.* **149**:1469, 1952. (7) Robinson, H. M., Jr., *et al.: Bull. School Med. Univ. Maryland* **38**:109, 1953. (8) Roper, K. L.: *Indust. Med.* **23**:50, 1954. (9) Costner, A. N.: *South. M. J.* **48**:1192, 1955. (10) Deacon, W. E., *et al.: Antibiotic Med.* **2**:143, 1956. (11) Josephson, J. E., & Butler, R. W.: *Canad. M.A.J.* **77**:567, 1957. (12) Blair, J. E., & Carr, M.: *J.A.M.A.* **166**:1192, 1958. (13) Goodier, T. E. W., & Perry, W. R.: *Lancet* **1**:356, 1959. (14) Rebhan, A. W., & Edwards, H. E.: *Canad. M.A.J.* **82**:513, 1960.

PARKE-DAVIS

Parke, Davis & Company, Ltd., Montreal 9, P. Q.

*REGISTERED TRADEMARK

CP-56160

of the room was held at 21 — 23°C and never changed more than 1°C during one experiment. All patients spent one hour at least in this room before the experiment; the last 15 — 20 minutes lying down. All patients studied showed a rise in skin temperature of 1.3°C on the average with the maximum amounting to 4.5°C. The maximum rise in temperature was reached on an average of 13 minutes.

The rise in temperature of the hand, elbow and shoulder were all measured and found to be proportionately identical to a physiological rise in temperature occurring in a normal person who for some physiological reason had to give up heat. In other words, the heat loss was not abnormally high at any one point of the upper extremity and thus obeyed physiological principles.

To explain the uniform rise in skin temperature of hypnotized subjects it must be assumed either that the internal body temperature would have to fall or that the BMR would have to increase. Therefore, rectal and skin temperatures on back of hand were compared. 1 — 2 minutes after the skin temperature began to rise a concomitant fall in rectal temperature occurred. The maximum fall in total body temperature was 0.8°C.
Basal Metabolic Rate: Because of the above findings, BMR investigations were undertaken. Here it was shown that the minute-volume dropped sharply and regularly in the hypnotic state. This was accompanied by a fall in BMR. The degree of change of the BMR was found to be related to the height of the stage of excitement at the start of hypnosis and the depth of hypnosis reached subsequently. The investigators felt that the experimental results with respect to the BMR were not extensive enough to postulate an obligatory drop during hypnosis.

In summing up the preceding series it may be concluded that since the internal body temperature and the respiratory minute-volume drop during hypnosis as well as during sleep, these two conditions appeared to be similar in certain respects. Yet major differences between the two states are known to exist. Thus, the;
(a) blood pressure does not fall in hypnosis as is the case during sleep; (b) cold acts as a waking stimulus in the sleeping person whereas hypnosis can take place even at 0°C with the patient dressed in a bathing suit; (c) during the hypnotic state the patient may remain motionless for hours whereas in sleep continuous bodily movements take place; (d) during the hypnotic state temperature regulation tends to be poikilothermal. Because of this latter characteristic, one could interpret the hypnotic state of man as representing a functional ontogenic and phylogenic reversion to lower forms of existence. This view would then support the psychoanalytical concept, which views hypnosis essentially as a regression phenomenon.
Organic Responses Elicited by Hypnotic Suggestions

When Kreibich at the Ninth Congress of the German Dermatological Society (Bern 1907) demonstrated histological slides of skin blisters produced by hypnotic suggestion he met with more or less general skepticism. Since then, these experiments have been carefully repeated many times and found to be valid. Further, hypnotic suggestion of analgesia has often proven capable of preventing or inhibiting the reaction of the organism to a chemical or mechanical stimulus. For example, the following experiment was carried out by Delboeuf (with the permission of the subject we are told). Delboeuf gave the suggestion that the patient's right arm was analgetic. Then both arms were burned with a red-hot iron, 8 mm. in diameter. The duration and the space covered by the application were identical in both cases; pain was perceived, however, only in the left arm. The burn spots were dressed and the subject was put to bed. During the night the pain in the left arm continued. On the following morning there was a burn, 3 cm. in diameter, encircled by a ring of inflammatory response. On the right side there was only the mark of a burn exactly the size of the iron but without redness or signs of inflammation. The following day the left arm became even more painful; then analgesia was successfully suggested whereupon the wound soon dried and the inflammation subsided.

Similarly, a wide variety of skin lesions have been produced and then in turn apparently cured by hypnosis. Particularly interesting are the studies conducted on the treatment of warts by hypnosis dealt with in the section on the therapeutic aspects of hypnosis.

Marcus and Sahlgren (1925) report a number of experiments dealing with the effect of hypnotic suggestion on blood sugar. They found first of all that hypnosis *per se* does not influence the blood sugar level. Nor was it possible to prevent the increase in serum glucose after the intake of 100 gm. of glucose by suggesting that it was only water. Likewise, an increase in serum glucose was not effected by the suggestion that the subject was taking sugar (in reality, saline). On the other hand, most of the hyperglycemic effect of an adrenaline injection was eliminated by the suggestion that the injected substance was only water. In another experiment 1/2 cc. of physiological saline was injected with the suggestion that it was adrenaline (the effects of which the subject, a medical student, was familiar). Considerable tachycardia, tremor and cold sweat

resulted. A definite increase in blood sugar, however, was not found.

R. T Woodyatt refers to Naunym who "in his classic textbook on diabetes calls attention to the fact that the severity of diabetes exhibited by diabetic patients is proved to vary in response to emotional stimuli". From his many confirmatory observations, Woodyatt cites the following:

A business man, age 65, in hospital on a diet and a small dose of insulin, was passing normal urine. Suddenly, one day, with no change in regime, he passed 43 gm. of sugar; another day, 76 gm. A careful physical check revealed no cause, but it was finally learned that he had just heard that his employer was taking steps to retire him. The author goes on to write: "It is interesting to be able to measure the power of emotion in terms so tangible as grams of sugar. The power of emotions to produce physical alterations of the body does not seem unreal under these conditions".

Heyer investigated by means of hypnosis the response of gastric secretions to the suggestion of specific foods. It was noted that gastric secretion markedly increased and changed in composition particularly in connection with the suggestion of the ingestion of fatty foods. In the course of these experiments, i.e., at a time the gastric secretions were well under way, the patients were subjected to vivid emotions: fear, fright, joy. These affects regularly disturbed the flow, irrespective of their euphoric or dysphoric nature.

E. Wittkower studied the effects of various affects on bile secretion. He found uniformly, in a series of 20 hypnotized patients that anxiety, sorrow and joy increased bile secretion 2 to 6 times. The effect was almost immediate, and subsided sharply. Annoyance, on the other hand, was found to occupy a unique position. For the duration of the annoyance, the bile secretion was enitrely, or almost entirely, inhibited. Whittkower suggests that psychic processes may constitute a contributing factor in gallstone formation.

H. E. Ruggles writes: "Every one knows the sinking feeling on receiving bad news, the epigastric cramp just before an important decision, the relaxation of sphincters in great fear. The intestine is equally responsive to emotional stimuli of lesser degree, and signs of their presence are constantly before us on the fluoroscopic screen. Thus, psychogenic disturbances if severe enough or prolonged enough may lead to secondary anatomical changes".

Volumes and volumes of books could be filled (and are being filled) with studies relating somatic changes with psychological factors. Hypnosis makes use of this interrelationship and proves beyond doubt that we can no longer think of illness as being either purely "mental" or purely organic. The reader will better understand the following section dealing with the practical applications of hypnosis, if he realizes that an illness is a living event taking place in a living organism which is, neither by nature, nor should be by us, compartmentalized into psychic or somatic segments.

PRACTICAL ASPECTS

Diagnosis

Unfortunately, the etiology of even the most simple neurosis is much more difficult to track down than is that of a bone fracture or pneumonia. Even if the patient had some insight into his problems and was aware of some of the factors leading to the development of his illness, often these thoughts are suppressed and no information gained.

It has been found that with the help of hypnosis patients can be asked to pass back through time to the event or events that could be considered the cause of their alcoholism, phobia, etc. Often, merely regressing a patient to an emotionally traumatic event and then telling him to relive it (i.e., abreact) will prove helpful. At other times, the patient may be asked to remember the event after he wakes up from hypnosis at which time it can be discussed thoroughly.

The hypnotic recall technique has also been found of diagnostic usefulness in hypnotizable seizure patients who profess an amnesia for all or part of their convulsions. The differentiation is done on the basis that the psychogenic epileptics' professed amnesia vanishes under hypnosis.

The statement that the diagnosis of epilepsy is more difficult than is commonly appreciated is well worth repetition. Further, it is believed that the incidence of psychogenic seizure of a generalized nature is much higher than is commonly suspected. Rossen found in a group of 469 navy personnel, admitted because of seizures, that the seizures of 209, or 44%, were not epileptic. In Summer's series of 142 patients, 72 were found to be epileptic and 70 psychogenic. From these and other series it would appear that about 45% of convulsive seizures are psychogenic. Following the above series it was noted that in those diagnosed epileptic, 93% had an abnormal EEG, and, in those diagnosed psychogenic, only 7% had an abnormal record. 71% of all patients with normal records were hypnotizable.

It has been reported that, not infrequently, epileptic and psychogenic seizures occurred in the same individual. Such a patient presents an intricate diagnostic and therapeutic problem. The patient's dosage and type of anticonvulsant

medication may be altered repeatedly because of unrecognized psychogenic seizures.

Therapy

From the preceding sections the reader has no boubt already recognized the great potentialities of hypnosis in the treatment of various disorders. Hypnotic technics have been successfully used for sedative or anesthetic purposes, for the treatment of a wide variety of psychosomatic disorders, or as an adjunct for patients with neurotic or psychotic disease. Within recent years hypnotic procedures have proved helpful in minimizing the pain associated with childbirth, spinal cord injuries, terminal cancer, fatal burns, mastoplasty and thyroidectomy. Some patients are hypnotized for pre-operative sedation or for setting fractures. The potential usefulness of hypnosis in physical medicine during the rehabilitation process is self-evident.

Although hypnotic technics are gradually finding a useful place in the anesthesiologist's armamentarium (especially in cases where the usual analgesics are contraindicated) the *means* by which "mere words" spoken by one person to another were able to exert an analgesic effect has been left largely unexplained. According to Barker, two factors seem to be operating; one of these is similar to a *placebo* effect, the other simulates the action of morphine.

Placebo Effect: In extensive studies of severe post-operative wound pain, Beecher (1957) found that about 30% of patients received satisfactory relief from a placebo. Naturally, placebo effects depend on the conviction of the patient that this or that effect will result. This belief is a function of many factors: what the patient is specifically told about the "drug", the patient's previous experience with pain and drugs, physicians, nurses and other hospital exposures.

Similarly, hypnotic analgesia is a function of the patient's conviction that the physician-hypnotist will relieve his pain. Obviously, the human body, by means which are ill understood, is capable of reacting not only to direct physical and chemical stimulation but also to symbolic stimuli, words and events which have somehow acquired a special meaning for the individual.

Morphine Effect: Beecher holds that narcotics alter pain sensation very little. In his opinion the relief of suffering appears to be secondary to an alteration in the patient's concern with, or anxiety about, the painful stimulation. Similarly, hypnotic procedures alleviate pain primarily by bringing about contentment and freedom from anxiety, necessarily altering the intensity of the painful sensation or elevating pain threshold.

Many striking accounts have appeared in the literature linking the use of hypnosis to the occurrence of circumscribed changes in the skin. Wolff and his associates have more recently reported on changes in tissue vulnerability induced by hypnotic suggestion. The report to follow is part of a more extended study concerned with the application of hypnotic suggestion to a clinic population with warts. The experiment was carried out at the Skin and Cancer Unit of University Hospital, New York. Visits were arbitrarily arranged at weekly intervals. Wherever possible, patients were observed for a minimum of 2 weeks prior to initiating the therapeutic procedure for the purpose of noting any spontaneous changes occurring in the warts. Hypnosis was attempted in a total of 62 patients. In every instance the therapeutic suggestion was to the effect that the treatment would be successful and that the warts would begin to disappear. The procedure was repeated on subsequent visits if little or no change in the warts was observed. During the period of observation and treatment the patient was cautioned against self-medication for the warts.

The patients were divided into two groups: those who met the criteria for deep hypnosis were regarded as good subjects (Group I), and those who did not as poor subjects (Group II).

Within a 4 week period after the therapeutic suggestion was given, 8 of 15 patients in Group I showed complete remission of their warts, in contrast to the occurrence of 2 cures in the 47 patients of Group II. These findings suggest that the hypnotic relationship may play a significant role in curing certain patients of warts.

G. R. Heyer writes: "Numerous authors report results from hypnotherapy in menstrual disturbances which are beyond question, i.e., relief of pain as well as regulation of the cycle. As a matter of fact, the time of onset of menstruation can be pre-determined in deep hypnosis to the day and hour, as for example one may suggest every 4 weeks, or every first day of the month, etc".

This brings us to the interesting topic of post-hypnotic suggestion, the applications of which are numerous. Thus, the patient with a peripheral vascular disease or peptic ulcer may have his tobacco intake blocked. The patient with severe pruritus (from poison ivy, trichomonal infection) may no longer be plagued by itch. Obese patients may post-hypnotically adhere to the optimum diets prescribed and lose weight with relative ease.

Hypnoanalysis

Hypnoanalysis refers to the technic of using hypnosis in conjunction with psychoanalysis. Its advocates believe that hypnosis adds an element of speed and directness to therapy without altering its dynamics. In psychoanalysis

the patient feels his way cautiously, parrying any intimate contact; contrastingly, in hypnosis, he experiences, from the start, feelings and attitudes of a deep-set nature which provide material for analysis. In addition to its effect on transference resistances, hypnosis has a remarkable influence on those resistances which are related to repression of traumatic memories and experiences. In a single session the patient may bring forth memories, the enucleation of which would require months of tedious psychoanalytic work.

It should not be assumed that it is possible to set aside all resistances merely by the induction of hypnosis. However, one may circumvent and more easily resolve ego defenses that keep unconscious material from gaining access to awareness. Hypnosis can thus substantially influence the first phase of analytic therapy, which is concerned with the *uncovering of unconscious material.* Hypnosis can also shorten the second or re-educational phase of treatment, for the hypnotic relationship permits easier incorporation and absorption of wholesome interpersonal attitudes. In hypnoanalysis the study of the patient's dreams is of vital importance. Dreams may be artifically stimulated on command during hypnosis or they may be post-hypnotically suggested to appear later during spontaneous sleep. Hypnotically produced dreams have all the characteristics of spontaneous dreams except that they are more easily interpreted. The dreams that follow the first attempts at hypnosis are tremendously significant and often contain the essence of the patient's problem.

Technics used as adjuncts in hypnoanalysis are age regression, automatic writing, hypnotic drawing, play therapy during hypnosis, hypnotic acting, crystal and mirror gazing, induction of experimental neurosis or conflict, and others. When the above methods fail, a light barbiturate (sodium amytal) narcosis sometimes will bring success.

One of the most important innovations in hypnoanalysis is the employment of a technic in hypnosis which calls for great activity on the part of the patient. Instead of being allowed to remain cataleptically inert, the patient is encouraged to express himself freely and spontaneously in both motor and ideational spheres. The release from the traditional hypnotic paralysis enables the patient to dramatize his inner problems with extraordinary facility. This use of the hypnotic state gradually brings the patient around to the realization that he must work out his own problems and assume responsibility for his actions. Aside from fostering insight into unconscious motivations and resistances, it has a most beneficial effect in *resolving the dependency strivings* aroused by hypnosis.

Hypnosis and Drugs

The patient who is chronically anxious may be rendered more accessible to hypnosis by phenothiazine derivatives which decrease central autonomic reactivity while they maintain a good cortical arousal pattern. In the patient in whom tension is prominent, with manifestations chiefly in the musculoskeletal system, a barbiturate or meprobamate preparation may be helpful.

It might be expected that drugs which cause spontaneous dissociative phenomena would at the same render difficult, or impossible, the maintenance of the hypnotic trance. This view has been confirmed with LSD-25, even though the subject under its influence may be more suggestible.

CONCLUSION

On the preceding pages, an attempt has been made to illuminate the subject of hypnosis from as many varied angles as space and time would permit. In view of what has been learned so far, it no longer seems justifiable to regard hypnosis as belonging to "The Twilight Zone of Medicine". It is rather *we* who, through lack of knowledge and interest are in the twilight zone of ignorance as far as hypnosis is concerned. This state of affairs can be changed; it should be changed; it demands to be changed.

BIBLIOGRAPHY

1. Heron, W.T.: G. P. 20: No. 3.
2. Spiegel, H.: A.M.A. Archives of General Psychiatry; 1: No. 6.
3. West, L.J.: J.A.M.A. 172; No. 7, 1960.
4. Kroger, W.S.: J.A.M.A. 172; No. 7 1960.
5. Barker, W. & Burgwin, S.: Arch. Neurol. & Psychiat.; 62:412, 1949.
6. Kupper: Psychosom. M.; 7:15, 1945.
7. Messel, E. & Ledford, F.F. Jr.: A.M.A. Arch. Neur.; Nov. 1959.
8. Bibl. Psych. et Neur. Supplementa ad Psych. et Neur.: Fasc. 107, 1959.
9. Marcus, H. & Sahlgren, E.: Munchen, med. Wochenchr.; 72;381, 1925.
10. Dunbar, H.F.: Emotions and Bodily Changes; 3 ed. Columbia.
11. Summer, J.W. & Cameron, R.R.: Neurology; 2:395.
12. Rossen, R.: Amer. J. Psychiat; 104:391.
13. Barker, T.X.: J.A.M.A.; 172: No. 7., 1960.
14. Beecher: Pharmacol. Rev.; 9:59-209, 1957.
15. Ullman, M. & Dudek, S.: Psychosom. Med.; 23, No. 1.
16. Wolberg, L.R.: Hypnoanalysis; Grune & Stratton, N.Y. 1945.

Fig. 1 — see page 189

Fig. 2 — see page 192

Fig. 3 — see page 192

Fig. 4 — see page 190

CIBA

PRESENTS

"ON INSPECTION"

L. M. JERRY, 6T1.

Fig. 5 — This lesion is often preceded by leukoplakia. What is the probable diagnosis?

Fig. 6 — What could this lesion be? Can you classify it pathologically?

Fig. 7 — What is the diagnosis? Can you give a pathological classification?

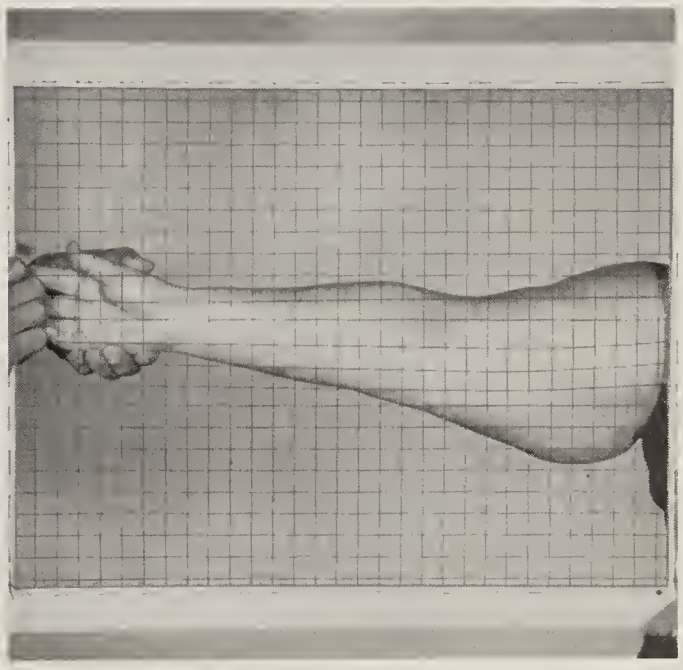


Fig. 8 — Explain the underlying mechanisms of this complication?

Answers to "ON INSPECTION" may be found on page 205

RADIOLOGY OF THE CHEST

G. KALCHMAN, 6T1.

"Only within very narrow boundaries can man observe the phenomena which surround him; most of them naturally escape his senses, and mere observation is not enough. To extend his knowledge, he has had to increase the power of his organs by means of special appliances; at the same time he has equipped himself with various instruments enabling him to penetrate inside of bodies, to dissociate them and to study their hidden parts". Claude Bernard.

As an adjunct to adequate history taking and physical examination, many diseases of the chest can be either confirmed or diagnosed by radiographic methods. Although radiological examination is now widely employed as a primary diagnostic measure, it should not be regarded as a short cut to diagnosis. In many respiratory and cardiac diseases, however, clinical examination must be supplemented by X-Ray. All intrathoracic structures are suited to radiographic examination and, at the present time, no patient can be said to be adequately studied without a chest X-Ray.

METHODS OF INVESTIGATION

Fluoroscopic

This method allows study of gross physiology, i.e. movements of the diaphragms, chest wall, heart, and barium-filled esophagus. Fluoroscopy has its limitations in that no permanent record is obtainable, the eyes of the examiner must be adapted to the dark, and the radiation hazards are greater than in the radiographic method, both to patient and examiner.

Roentgenographic

Film studies permit perception of greater detail and finer differences in density, and also serve as permanent records. With a few deliberate exceptions, chest exposure times are kept as short as possible in order to freeze the motion of the heart and great vessels. Most chest films are exposed on inspiration, but expiratory or midrespiratory films are occasionally useful.

(1) *The postero-anterior six foot film:* This is the routine scout film for X-Ray study of the chest. It is exposed on inspiration with a short (1/20 sec.) exposure time.

(2) *The postero-anterior stereoscopic film:* Here a pair of films is obtained consisting of views taken with slightly different positions of the X-Ray tube. Thus, small or faint densities are less likely to be overlain and obscured by ribs or other densities. Further advantages claimed for this technique are intensification of contrast and the perception of depth prevents misinterpretation.

(3) *The antero-posterior film:* This view is used for study of the posterior thoracic wall and at times for the visualization of posterior pulmonary lesions. It is also performed at the bedside in cases where the patient is unable to sit up.

(4) *The left lateral film:* This is the most valuable view exclusive of the P-A film. The lateral projection, being at ninety degrees to the P-A projection, is the best way of evaluating the extent of intrathoracic densities. It also has the advantage of displaying portions of the lung posterior to the heart and domes of the diaphragm.

(5) *Other Views:* These include left anterior oblique, right anterior oblique, lateral decubitus, and apical views. The following contrast studies are also used;

1. Barium filled esophagus.
2. Iodized oil in the tracheobronchial tree.
3. Water-soluble iodized compounds in the lumina of the heart and vessels.
4. Iodized oil to outline sinus tracts and empyema cavities.

Fig. 9 — P.A. Chest — Normal.

INTERPRETATION

The routine examination of a P-A film can be undertaken in 9 major steps. Fig. 10 represents the normal chest and should be referred to in the following discussion.

Fig. 10 — Lateral Chest — Normal.

I. *The Volume of the Lung Fields as a Whole*

II. *The Bony Thorax*

The inspection begins with the clavicles. These bridge the upper portion of both lung fields and subdivide the apices from the rest of the lung.

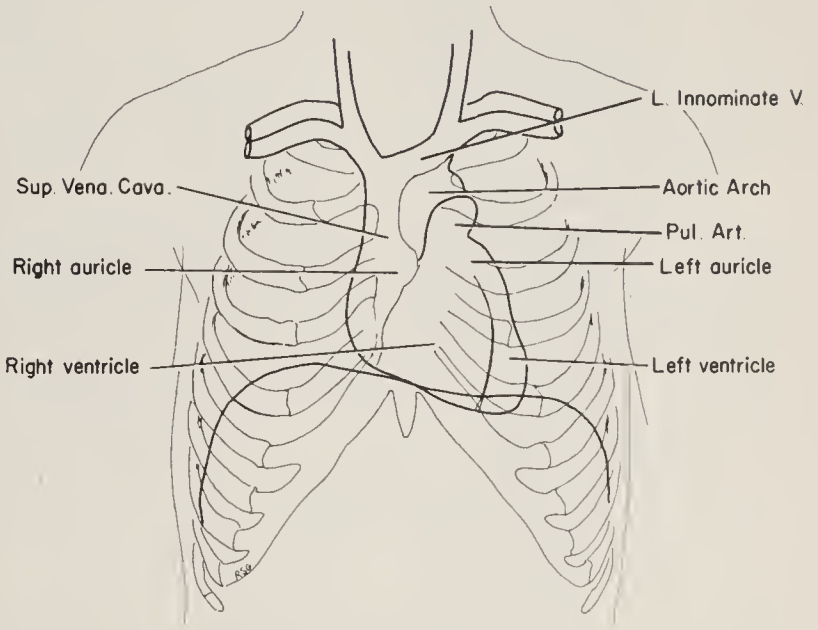
The thoracic cage, proper, includes the thoracic spine and the ribs. The ribs are much lower in their anterior than in their posterior portions. The anterior ends of the ribs are cartilaginous and may appear as gaps in their continuity. The size of the interspaces is also of importance in the determination of pulmonary or pleural pathology.

III. *The Heart and Mediastinum*

The cardiac shadow appears as a density in the centre of the chest, clearly shown in sharp contrast to the marked radiolucency of the air-filled lungs. The radiological anatomy is depicted below. The shape and size of the heart varies with the type of individual. The asthenic person tends to have a small, long, narrow heart; that of the sthenic individual is much more prominent on the left that the right.

With deep inspiration, the heart becomes long and narrow; with deep expiration, it becomes short and broad. If exposure is made during ventricular systole, the heart size will appear smaller.

Projection of the heart on the Anterior Chest Wall.



IV. *Hilar Shadows*

In addition to the shadow of the heart and aorta, the mediastinal shadow includes the hila (Rigler). These are irregular areas of density on each side of the heart, the left one somewhat hidden by the cardiac shadow. The hila consist of the larger bronchi, the pulmonary vessels, and the tracheobronchial lymphatic tissue.

V. *The Broncho-vascular Structure*

These pass out from the hilar shadows as a group of dense radiating lines, heavier near the hila, and becoming thinner peripherally. They are always heavier inferiorly and are formed by the pulmonary vessels and the bronchial walls.

VI. *The Lung Parenchyma*

The lungs produce two areas of decreased density showing characteristic markings (above) of air-filled vesicles surrounded by blood vessels.

The following is an anatomical classification which is widely used:

APEX: that part of lung superior to clavicle

BASE: that part of lung immediately above the diaphragm.

LOBES:

Right Lung

i) Upper Lobe
   Apical
   Anterior
   Posterior

ii) Middle Lobe
   Medial
   Lateral

iii) Lower Lobe

Superior
Anterior Basal
Posterior Basal
Medial Basal
Lateral Basal

Left Lung

i) Upper Lobe
Anterior
Apical Posterior

ii) Lingular Lobe
Superior
Inferior

iii) Lower Lobe
Superior
Anterior Medial Basal
Lateral Basal
Posterior Basal

The upper and middle lobes of the right lung are separated by the *major fissure* from the lower lobe. This fissure may sometimes be seen as a thin white line running from approximately the level of the second dorsal vertebra to the sixth costal cartilage.

The middle lobe is separated from the upper lobe by the *minor fissure* which is represented by a line running transversely from the fourth costal cartilage to the major fissure at the level of the fifth rib in the mid-axillary line.

Inspiration greatly increases the radiolucency of the lungs, especially at the bases. Coughing increases the radiolucency at the apices, while a rapid pulse causes haziness about the hilum.

It should be noted that pectoral muscles, breasts, nipples, clothing and skin tumours can all cause shadows over the lung fields.

VII. *The Trachea and Bronchi*

The trachea appears as a vertical strip of radiolucency lying over the cervical spine in the mid line. It passes down into the thorax to its division into two main stem bronchi at the level of the lower sternal border. Often these bronchi can be visualized, especially in children, as areas of radiolucency. The right bronchus is more vertical than the left. Beyond the bifurcation, the bronchi contribute to the bronchovascular markings already described.

VIII. *The Pleura*

Normally the shadow of the pleura can only be seen when films are taken at an angle, and then only at the points of reflection over the diaphragms, at the mediastinum, at the apices, and frequently in the major fissure.

IX. *The Diaphragms*

The diaphragms produce smooth, domed shadows forming the lower boundary of the lungs. The right dome is one to two cm. higher than the left because of the position of the liver. An acute angle is formed with the lateral chest wall, and on inspiration, there is a free even downward movement seen fluoroscopically.

DISEASES OF THE CHEST

Bony Thorax

The commonest X-Ray examination of the ribs is for the detection of *fractures.* The injury usually involves only one aspect of a hemithorax, i.e. anterior, lateral, or posterior aspects. Rib fractures can be ruled in or out by taking frontal and right and left oblique films of the affected hemithorax.

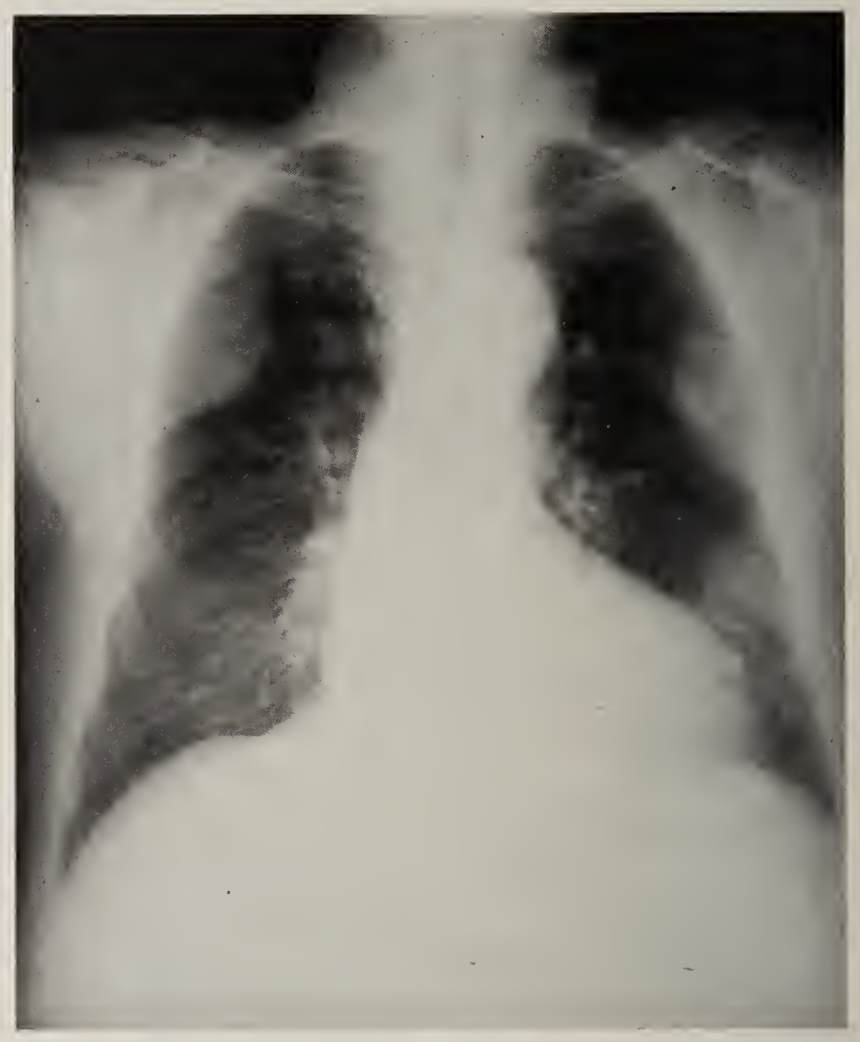


Fig. 11 — Multiple Secondary Deposits in Ribs (Primary Hypernephroma).

Malignant disease is sometimes first diagnosed by radiological evidence of rib involvment. Multiple myeloma is notorious in this respect and metastatic disease from distant sources may also involve the ribs. Of the *benign tumours,* chondromas and osteochondromas are sometimes seen. The ribs may also be affected in generalized *metabolic disease* of which rickets (rachitic rosary), scurvy, osteomalacia and Cushing's disease are the most prominent. Notching of ribs due to dilatation and elongation of the intercostal artery in patients with *coarctation of the aorta* is a common finding. One normal phenomenon which sometimes beguiles the uninitiated is a physiological edentation of the first and second ribs produced by muscle attachments.

The *sternum* is deformed in funnel chests with the body and xyphoid process lying at the

bottom of a depression. When fracture of the sternum occurs, it is usually transverse.

The *thoracic spine* may show deformities, as in kyphosis (anteroposterior deformity), scoliosis or kyphoscoliosis. Fractures are relatively rare in the thoracic spine and they are often clinically symptomless. In senile osteoporosis the bony portions are seen to have lost their normal density, a condition that may also occur in postmenopausal osteoporosis and osteoclastic metastatic growths. Secondaries from prostate, breast, lung and melanoma may all cause decreased density of bone, though the prostate commonly produces circumscribed areas of increased density.

The Heart and Mediastinum

Congenital Heart Disease: The X-Ray findings are seldom conclusive or characteristic, but sometimes differentiation between congenital and acquired heart disease can be made. The most striking feature of congenital heart disease is the enlargement of the right ventricle, enlargement of the main pulmonary artery, and abnormalities in the positions of the great vessels. In *patent ductus arteriosus,* dilatation of the pulmonary trunk is seen in addition to enlargement of the right ventricle. Some left ventricular enlargement is also seen. *Transposition of the great vessels* produces marked enlargement to the right, a rotation of the cardiac shadow, and distortion of the base. In the *tetralogy of Fallot,* the apex is seen to extend out to the left and far above the diaphragm. In the lateral view the apex is all right ventricle. Some enlargement of the pulmonary trunk may also occur. *Septal defects* (atrial and ventricular) produce enlargement of the right ventricle and atrium.

(see Fig. 1, page184 — Mitral Stenosis).

Acquired heart disease: mitral regurgitation is characterized by prominence of the main pulmonary artery often with moderate enlargement of the left atrium. *Mitral stenosis* is evidenced by marked enlargement of the left atrium causing compression and displacement of the esophagus, posteriorly. In *aortic stenosis,* the left ventricle is rounded, the apex blunted, and the aorta may be large or small. *Aortic regurgitation* features dilatation of the left ventricle with the apex displaced downwards. The aorta is often dilated. In *hypertension,* various stages are frequently observed ranging from mild cardiac hypertrophy to gross cardiac enlargement. *Cor pulmonale* is a result of chronic pulmonary disease, and the pulmonary trunk becomes greatly dilated, there is right ventricular enlargement and the left atrium appears normal. In *coarctation of the aorta* prominence of the ascending aorta with left ventricular enlargement is often apparent, together with notching of the ribs as already described.

Diffuse aortic enlargement is usually accompanied by a large heart and may be the result of arteriosclerosis, producing lengthening and tortuosity, calcification or luetic aortitis with or without regurgitation and hypertension.

Aortic Aneurysm may be either mediolateral or anteroposterior. Saccular aneurysms of the ascending portion of the aortic arch are syphilitic in origin while fusiform aneurysms, though rare are usually arteriosclerotic in origin. In *pericardial effusion,* a flask-shaped or triangular heart shadow is seen with a gross increase in cardiac size and loss of chamber markings. Fluoroscopically, there is lack of pulsation at the apex and no contour change is noted with respiration. *Constrictive pericarditis* is characterized by a heart that appears smaller than normal, with dense opacities (calcium) at the periphery of the cardiac shadow. There are absent or diminished cardiac pulsations with paradoxic movement of the heart during respiration as seen under the fluoroscope.

The Mediastinum (including hilum)

Mediastinitis: This is commonly due to a chronic inflammatory process in the posterior mediastinum. Here, the density on either side of the heart is increased with dense bands reaching down to the diaphragm while the heart, itself, is seen to have paradoxical movement on fluoroscopy.

Mediastinal Effusion: The fluid. (either pus or serum) is usually encapsulated in the mediastinal pleura. On lateral films, the posterior mediastinum remains opaque on inspiration, where normally it becomes clear. On P-A views, the heart appears displaced to the left and there is a "double contour" appearance on the right side of the cardiac shadow.

Mediastinal abscess: This is more commonly seen in the superior mediastinum with the posterior mediastinal abscess following a close second. An ill-defined opacity, somewhat diffuse, is seen posteriorly, or bilaterally.

Lymph Node Enlargement: This produces lobulated densities on either side of the cardiac outline, either superiorly and/or inferiorly. These are dense, irregular, multiple and of varying sizes. The more common diseases with enlargement of root shadows are:

Hodgkin's disease, lymphosarcoma, tuberculosis, leukemia, inflammatory diseases of lung, chronic bronchitis with emphysema, silicosis, bronchogenic carcinoma, metastases from carcinoma of breast, sarcoidosis and erythema nodosum. Certain other entities produce widening of the mediastinal shadow. Among these may be mentioned. substernal thyroid, dilatation

of the great vessels, the thymus gland and dilatation of the esophagus.

The Lung Parenchyma

The problem is mainly one of differential diagnosis.

DIFFERENTIAL DIAGNOSIS

of Generalized Increased Density

Pleural effusion
Pleural thickening
Lobar pneumonia
Atelectasis
Pulmonary fibrosis
Massive tumour
Pulmonary edema
Fluid filled cyst
Massive infarction

of Generalized Increased Radiolucency.

Pneumothorax
Obstructive Emphysema
Chronic Hyperthrophic Emphysema
Giant air cyst

of Localized Increased Radiolucency

Localized pneumothorax
Cavitation
Abscess
Localized bullous emphysema
Small air cyst
Bronchiectasis

of Increased Bronchovascular Markings.

Pulmonary congestion
Pulmonary edema
Silicosis
Pulmonary fibrosis
Polycythemia
Leukemic infiltration
Metastatic carcinoma of lymphatic spread

of Multiple Small Nodular Densities

Miliary tuberculosis
Miliary metastatic carcinoma
Acute bronchiolitis
Interstitial pneumonia
Sarcoidosis
Fungal infiltration

of a Homogeneous Density

Lobar pneumonia
Bronchopneumonia
Viral pneumonia
Abscess
Pulmonary edema
Pleural effusion
Bronchogenic carcinoma
Solitary secondary carcinoma

The Pneumonias

(see Fig. 4, page 184 — Lobar Pneumonia of Right Upper Lobe).

Lobar (Pneumococcal) Pneumonia: Characteristically, this is evidenced by inflammatory consolidation of large bronchopulmonary segments, often lobes. Classically, this is exhibited by a series of pathological changes occurring in succession, i.e., congestion, red and gray hepatization, resolution and restoration to normal. Radiologically, there is a homogeneous opacity localized in the affected lobe or segment, appearing 12 - 18 hours after the onset of the illness. X-Ray examination is particularly helpful when the diagnosis is in doubt or if a complication such as empyema is suspected.

Bronchopneumonia: The roentgenological manifestations include patchy, poorly defined irregular areas of density usually bilaterally. Atelectasis of small segments occurs and areas of rarefaction within the pneumonic densities indicate the suppurative form of this condition or an underlying bronchiectasis.

Viral Pneumonia: Primary Atypical Pneumonia presents irregular streaks of haziness and opacity due to interstitial and peribronchial inflammation. At times, haziness and/or densities, due to edema in the alveoli are seen. Rib fracture, at or near the anterior axillary line may occur as a result of violent coughing.

Aspiration Pneumonia: The dependant segments of the lungs are involved presumably through gravitation of the aspired contents. The right side shows greater involvment than the left in most cases. Typically, the densities appear medially in each lung base.

Other Pneumonic Processes: They may give more or less characteristic pictures. Of these may be cited; staphylococcal pneumonia, fungal pneumonia, influenzal bronchopneumonia, tuberculous pneumonia, eosinophilic pneumonia (Loeffler's syndrome), malarial pneumonia parasitic pneumonia.

Bronchiectasis

Multiple dilatations of bronchi, either fusiform or saccular, can produce radiographic changes. In ordinary radiographs, the dilated bronchi themselves are rarely visible, but X-Ray changes may be produced by associated pulmonary inflammation or atelectasis. The diagnosis of bronchiectasis can be made with certainty only from radiographs taken after the introduction into the trachea of an iodized contrast medium, which outlines the bronchi

COUGH

responds to treatment with

"PINOCODEINE" (N)

BRAND

Each fluid ounce contains:

Pinus strobus	32 gr.	(2.1 G.)
Prunus virginiana	32 gr.	(2.1 G.)
Sanguinaria canadensis	4 gr.	(0.25 G.)
Populus balsamifera	2 gr.	(0.12 G.)
Chloroformum	1 min.	(0.06 cc.)
Codeinae phosphas	1 gr.	(60 mg.)
Flavoured syrup base		q.s.

(N) Telephone narcotic prescription permitted.

DOSAGE: One or two teaspoonfuls every four hours.

Packaged in 16 fluid ounce bottles.

Charles E. Frosst & Co.

MONTREAL CANADA

and demonstrates the bronchial dilatation, its position and extent.

Lung Abscess

A homogeneous density tending to be either spherical or excavated is seen. A central area of rarefaction is often observed and an air fluid level can be demonstrated if a fistula occurs between bronchus and cavity. The inner wall of the cavity tends to be smooth and sharply defined and atelectasis of some degree may be present as well as a small pleural effusion.

Atelectasis

(see Fig. 2, page 184 — Atelectasis; showing mediastinal and tracheal shift. Note also fractured clavicle).

A marked density of one or more lobes, often resembling pneumonic consolidation is seen. In addition, there is diffuse mottling throughout the lung and upward displacement of the diaphragm on the side of the atelectatic segment. There is a compensatory emphysema of the normal lung. There may be a shift of the trachea, heart and mediastinum to the affected side.

Pulmonary Emphysema

(see Fig. 3, page 184 — Emphysema).

There are no definite radiological signs, but there may be a few suggestive ones. The lung fields are unusually clear; the diaphragmatic shadows low and flat especially when respiratory excursion is greatly limited. There is undue prominence of the pulmonary arterial shadows at both hila, and in the end stage, there may be right ventricular enlargement, indicating cor pulmonale.

The Pneumoconioses

The first radiological abnormality is a fine nodulation which is evenly distributed throughout the lung fields. Later, these small discrete densities become larger and more dense. Rarely, breakdown of these lesions can occur resulting in cavitation. Cavities may be apparent should pulmonary tuberculosis supervene, as it commonly does with silicosis.

Pulmonary Infarction

Seldom are the radiological features of infarction diagnostic. The classical wedge-shaped density is only rarely seen. Pleural and linear opacities are occasionally visible.

Tumours of the Bronchi and Lungs

Primary:

Benign: Bronchial adenoma

Malignant: Bronchogenic carcinoma or sarcoma (rare).

Secondary:

Carcinoma: Most commonly from breast, kidney, thyroid, and testicle.

Sarcoma: Osteogenic sarcoma and Melanotic sarcoma.

With the exception of secondary carcinoma, bronchogenic carcinoma is the one most commonly seen. It appears on X-Ray in one of three main ways: (1) A dense irregular parahilar opacity; (2) A dense well demarcated peripheral opacity; (3) An opacity compatible with atelectasis of a whole lung, lobe or segment. This may or may not be associated with a dense irregular parahilar opacity due to the tumour itself. In some instances, a pleural effusion may be present, indicating either infection or secondary pleural spread. Glandular metastases may be suspected if there is mediastinal widening.

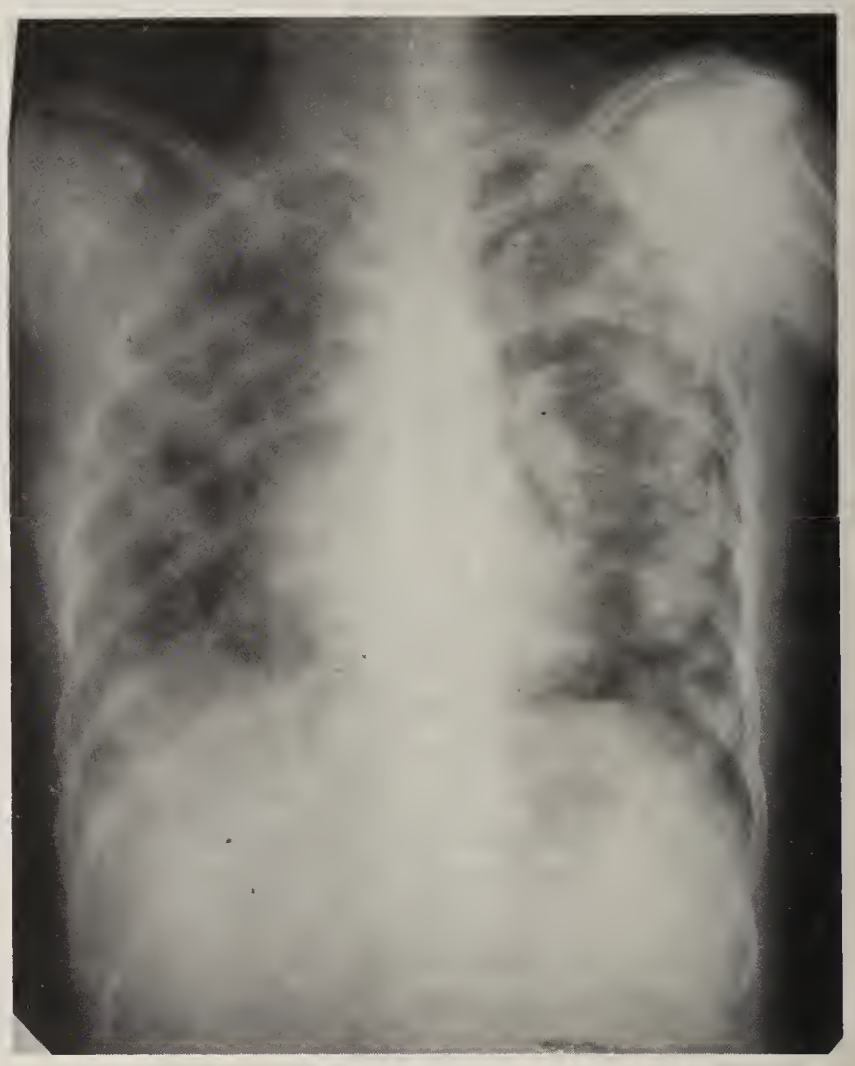


Fig. 12 — Secondary Carcinoma (Primary Chorionepithelioma).

Secondary carcinoma in the lung begins as small, irregular, dense shadows which become larger and more numerous in time. The lower lobes seem to be affected to a greater degree than the other lobes. Pleural involvment with thickening and effusion is not uncommon. Miliary metastases may be easily confused with miliary pulmonary tuberculosis.

Pulmonary Tuberculosis

Entire volumes have been devoted to this subject, thus it is obvious that any discussion of this condition here will not do it justice. How-

ever, a few salient features should be remembered: Negative X-Ray examination is the most conclusive evidence of absent disease. Next to a positive sputum, characteristic X-Rays are the most positive sign of pulmonary tuberculosis. The progress of the disease can be followed by films. If symptoms due to pulmonary tuberculosis are present, there should always be abnormal X-Ray findings in the lungs.

Fig. 13 — Tuberculosis Cavitation

Primary Pulmonary Tuberculosis: In complicated cases, enlargement of the hilar nodes on one or both sides is evident. The earliest radiological change is an ill-defined opacity (or opacities) situated anywhere in the lung fields. In advanced cases, the opacities are larger and more widespread and may be seen bilaterally. In tuberculous pneumonia, there is a dense homogeneous shadow usually involving a whole lobe; in tuberculous bronchopneumonia, ill-defined mottled opacities are seen. An area of radiolucency within the opacities indicates cavity formation. If healing is occurring, the cavities decrease in size and become more clearly defined and show calcification. The presence of calcification usually means active disease but when cavitation is not apparent, it is difficult and even impossible to assess the activity of the lesion. The lesion must be observed over a period of time in order to draw any conclusions.

The Pleura

Pleural Thickening: This presents as a dense linear shadow at those points where the entire A-P thickness of the pleura is struck by the beam. These are best exemplified by the major and minor fissures.

Pleural Effusion: Pleural fluid flows freely and as a result, with the patient in the upright position, the fluid will be in the dependant portions of the pleural space. In the lateral decubitus position, the fluid, in response to gravity, may be seen to flow, fluoroscopically. On radiography, a homogeneous density is observed. The costophrenic angle is obliterated and the diaphragm is immobilized and displaced downwards. There may be a mediastinal shift to the opposite side. The costal interspaces may be widened as fluid accumulates. The upper surface of the fluid is curved, the highest point being at the periphery.

Empyema: Similar to pleural effusion. In some instances, adhesions may prevent the formation of the curved level or mediastinal displacement. This also applies to *hemothorax.* When the pleural fluid is *encapsulated,* a sharply defined rounded opacity is observed, with convex outer borders. Infection here is indicated by pleural thickening or fluid. An air-fluid level may be seen where a broncho-pleural fistula exists.

Pneumothorax: Examination reveals a sharp edged shadow of the collapsed lung; between this and the chest wall there is complete translucency with no lung markings. The diaphragm may be flattened and the mediastinum may be displaced to the opposite side.

Hydropneumothorax: An air-fluid level is seen in the pleural space; a splash of the fluid or a change in the level on fluoroscopic examination may be observed.

Neoplasia: Endotheliomata are multiple, rounded densities. Neurofibromata which are seen as rounded masses which at times cannot be localized to either the lung parenchyma or the retropleural area in the posterior mediastinum.

Differential Diagnosis of a Dense Shadow Involving Part or All of One Hemithorax,

Pleural Effusion
Pneumonic Consolidation
Atelectasis
Pulmonary Fibrosis
Tumour
- Bronchogenic Carcinoma
- Bronchial Adenoma
- Secondary Carcinoma
- Neurofibroma
- Endothelioma
- Hamartoma

CONCLUSION

We may well consider time as a fourth dimension (Rigler) in the determination of the significance of X-Ray findings. The time taken for infective invasion, or neoplastic inception, would be the best reference points. Because both of these are often unknown, the time of onset of *symptomatology* can well be employed. It is obvious that some time must elapse between the actual inception of a disease process and its radiological evidence. Therefore the onset of symptoms may be used to best advantage as a point of reference. The time variation in different disease processes may be considerable: in some cases the radiologic findings preceed the onset of symptoms, in others, the interval before the appearance is brief, or, again, a long delay may occur between the development of clinical symptomatology and the X-Ray evidence of disease.

ACKNOWLEDGMENT — The author wishes to thank Dr. L.R. Harnick, Dr. D.J. Berens, and the Radiology Department of the Toronto Western Hospital for their helpful suggestions and for the radiographs used in this article.

BIBLIOGRAPHY

1. Davidson; The Principles and Practice of Medicine: E. & S. Livingstone, Ltd. 1958.
2. Delorimier, *et al.*; Clinical Roentgenology, Vol. III: Charles C. Thomas, 1955.
3. Rigler, L.G.; Outline of Roentgen Diagnosis: Lippincott, Edition II; 1943.
4. *Ibid;* Roentgen Examination of the Chest: J.A.M.A. 142: 773: 1950.

HAPTOGLOBIN

FRED ROSEN, 6T2.

Jayle and Polonovski, in 1938, discovered a serum globulin which bound hemoglobin stoichiometrically in a 1:1 ratio (1). They called it haptoglobin from the Greek *hapten,* to bind. Hemoglobin acts as a weak peroxidase, and the enzymatic activity is modified by complex formation with haptoglobin. Hemoglobin "peroxidase" has a pH optimum of 5.3, but the complex is more active in more acidic solutions. It appears that haptoglobin protects the hemoglobin from acid denaturation, allowing it to exhibit enzymatic activity at a much lower pH than it could were it unbound.

Haptoglobin is a mucoprotein containing 17% carbohydrate (galactose, mannose, hexosamine, and sialic acid). Haptoglobins from different individuals may have different molecular weights, (see genetic section below), but the simplest of the haptoglobins has a molecular weight of 100,000. The corresponding Hb-Hp complex consists of one molecule each of hemoglobin and haptoglobin, and therefore has a molecular weight of 165,000. The nature of the bonding in Hb-Hp is still a mystery; however, it is probably due to electrostatic interaction and other short-range forces.

GENETIC POLYMORPHISM OF HAPTOGLOBIN

In 1955, Dr. Oliver Smithies, working at the Connaught Laboratories, developed a method of zone electrophoresis in a starch gel medium (2). On paper electrophoresis haptoglobin appeared as a single zone in the alpha-2 region. Starch gel patterns of certain individuals, on the other hand, when properly stained, display many haptoglobin zones. Three distinct haptoglobin patterns were found in different individuals, and these Smithies named types I, IIA, and IIB (now called types 1-1, 2-1, and 2-2, respectively). It soon became apparent that the three haptoglobin types were genetically determined. Smithies, working with Dr. Norma Ford Walker (3) of the Hospital for Sick Children, postulated two autosomal genes at the haptoglobin locus, Hp-1 and Hp-2. There are three genotypes Hp-1/Hp-1 (homozygous), Hp-1/Hp-2 (heterozygous), and Hp-2/Hp-2 (homozygous), corresponding to the three phenotypes mentioned above. Starch gel patterns of serum of the three common types are shown in Fig. 1. A modified haptoglobin type, (2-1 M), has been described, which is fairly common in American Negroes.

This type differs from type 2-1 only in the relative amounts of haptoglobin in the separate zones. Individuals with a congenital absence of haptoglobin, (type 0-0), are encountered occasionally. Newborn children have no detectable haptoglobin, but after a week or so, their type can be readily ascertained by starch gel.

must confine itself to the only known functional property of this protein—namely binding hemoglobin. It becomes important, then, to realize under what circumstances hemoglobin might normally be found dissolved in plasma. The breakdown of red cells is thought to take place extravascularly in the reticulo-endothelial sys-

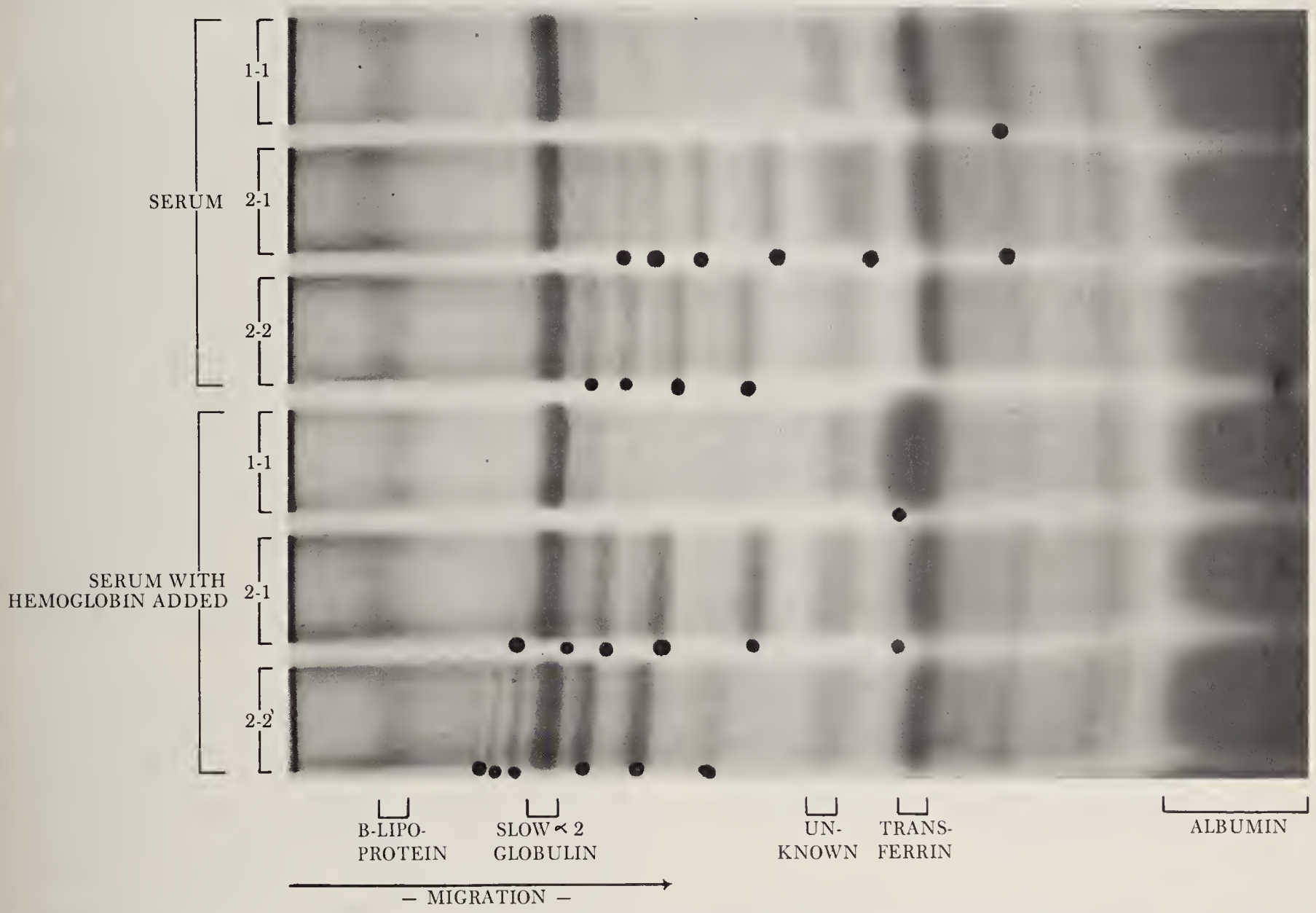


Fig. 1. Photograph of a starch gel stained with Amido Black. The samples of human serum are of types 1-1, 2-1, and 2-2. Hemoglobin has been added to the three samples at the bottom; it has been completely bound. The haptoglobin zones in the top three slots, and the Hb-Hp zones in the bottom three slots are designated by black dots.

Many population studies have been done to determine the relative frequencies of the different phenotypes. One such study, done on 1033 unrelated Scandinavians (4), showed the following distribution: type 1-1, 16%; type 2-1, 48%; type 2-2, 36%. The frequencies of the different types are about equal in men and women. Furthermore, there is no direct correlation between haptoglobin type and any known blood groups (ABO, Rh, etc.) (3). The typing of haptoglobin by starch gel is a quick and inexpensive procedure and is already being done routinely in Sweden in legal suits arising out of disputed paternity.

PHYSIOLOGY OF HAPTOGLOBIN

A discussion of the physiology of haptoglobin

tem. However, possibly some red cells are destroyed intravascularly in normal individuals. Free hemoglobin in the plasma would be taken up by haptoglobin. Hemoglobin in excess of the hemoglobin-binding capacity of the plasma would pass into the urine. Laurell and Nyman (5) point out that hemoglobinuria was not observed in healthy individuals until the serum concentration of hemoglobin reached 100-135 mg. per 100 ml. This value is perhaps just a little above the average hemoglobin-binding capacity, the difference being due, possibly, to the small amount of tubular reabsorption which may take place (6).

The body stores of iron are regulated by intestinal absorption, the excretion being minimal.

Perhaps haptoglobin, by binding hemoglobin, prevents the loss of iron in the urine.

Assuming that haptoglobin does bind a part of the hemoglobin liberated from red cells, one wonders how the complex is disposed of metabolically, and if its catabolism is any different from that of hemoglobin. Experiments on rabbits with Fe59 hemoglobin labelled *in vivo* showed that Hb-Hp is not cleared from plasma as rapidly as hemoglobin (7). This reflects partly the relative rates of excretion of the two compounds by the kidney. (Since hemoglobin is a smaller molecule, it can pass through the glomerular tuft more readily than can Hb-Hp.) However, other factors are also operating. The liver was found to be the main site of disposal of hemoglobin and Hb-Hp, and, since their clearance rates are different, possibly the two compounds are handled differently by the liver cells. It is interesting to note that the half-life of free haptoglobin in rabbits is several days (8). It seems, therefore, that hemoglobin, Hb-Hp, and haptoglobin are all disposed of in a different manner.

Experiments on haptoglobin physiology have been performed on humans as well (5). Hemoglobin injected into subjects was bound by haptoglobin, the half-life of the Hb-Hp being 3-4 hours. The level of free haptoglobin dropped to zero, and that of bilirubin went up steadily. After one day, the hemoglobin and bilirubin had dropped down to their normal low physiological levels, but the haptoglobin remained low, and only after a week did it rise to the characteristic level for the subject involved. Haptoglobin therefore is destroyed along with hemoglobin, and not re-utilized.

ESTIMATION

Blood haptoglobin level can be measured on the basis of (1) the peroxidase activity of Hb-Hp complexes or, (2) electrophoretic mobility on starch gel or paper. Jayle (1951) described a method of estimating haptoglobin using ethyl hydrogen peroxide as the oxidizing substrate and iodide as the electron donor, and titrating the I 2 form with thiosulphate. Connell and Smithies (9) use hydrogen peroxide as the oxidizing substrate and guaiacol as the hydrogen donor. The guaiacol becomes oxidized to tetraguaiacol which absorbs light at 470 mu., and the reaction is followed spectrophotometrically. Both these methods depend on the difference in peroxidase activity of hemoglobin and Hb-Hp.

The second general method of determination makes use of electrophoresis. Hemoglobin is added in serial dilutions to samples of the serum to be tested, and the mixtures are run on starch gel or paper electrophoresis. On staining of the gel or paper with a suitable dye, one can observe the segment in which the added hemoglobin is completely bound by the serum haptoglobin. In this segment there will be no free hemoglobin, while in the adjacent segment with a slightly higher hemoglobin concentration, some free hemoglobin which was not bound will be seen running behind the Hb-Hp complex.

CLINICAL SIGNIFICANCE

The blood level of haptoglobin is expressed either as mg.%, or as mg. hemoglobin-binding capacity per 100 ml. of blood. Although there are individual variations, the haptoglobin level of any one healthy person remains within fairly narrow limits. The average physiological value in the general population is 110 mg. per 100 ml. The significance of the haptoglobin level in various diseases has been excellently summarized in a publication by Margareta Nyman (10).

In pneumonia and acute infections, the haptoglobin level increases three- to four-fold, reaching a peak value 10 to 11 days after the onset of the infection. The haptoglobin level then slowly drops back to about one quarter of its original value. The haptoglobin level falls after 3 or 4 days of antibiotic therapy. It has been demonstrated that haptoglobin binds diptheria toxoid and therefore may play some role in the body's defence mechanism (11).

A 10 — 15 fold rise in serum haptoglobin can be produced experimentally in rabbits by a subcutaneous injection of turpentine (or other irritating organic compound). A peak is reached 48 hours after the injection, the haptoglobin level then slowly dropping back to normal. An injection of turpentine thus simulates an acute infection.

Cancer and haptoglobin level bear very little correlation with each other. However, it has been found that in cancer with lung or bone involvment, the plasma haptoglobin usually rises. Haptoglobin level varies with the site, rather than with the severity of the disease process.

Haptoglobin levels have been studied in other diseases. In chronic hepatocellular failure, the haptoglobin level drops; alternatively, a high haptoglobin level in jaundice is very suggestive of the obstructive type.

The fluctuations of haptoglobin bear a direct relationship with fibrinogen and alpha-1 globulin levels. For example, in infectious mononucleosis, fibrinogenolysis increases and haptoglobin decreases.

In stress, and also in androgen and corticosteroid administration, the haptoglobin level rises. Estrogens produce a fall in haptoglobin level; the haptoglobin level is accordingly found to be high during menstruation.

Diseases involving necrosis, inflammation, and cellular proliferation produce a non-specific rise in blood haptoglobin. Thus haptoglobin is useful not as a diagnostic tool in inflammatory or cancerous lesions but as a partial confirmation of a previous diagnosis.

The picture changes entirely in hematologic disorders with intravascular, extravascular, or intramedullary hemolysis. Hemolysis almost always produces a low haptoglobin level. Studies have been performed on anemic individuals, injecting them with Cr51 red cells, labelled *in vitro* (12). It was found that haptoglobin levels varied with the half-life of the red cells, and that ahaptoglobinemia occurred in cases where the half-life was less than 17.5 days. Haptoglobin determination, then, fulfils two functions in hematologic disorders. Ahaptoglobinemia is suggestive of hemolytic anemia. Secondly, haptoglobin level may be useful in the determination of red blood cell life span, a short life span producing a low haptoglobin level.

Gamma-globulin is injected into patients with a low endogenous gamma-globulin level to combat infection. This is because the gamma-globulin fraction has the specific function of carrying antibodies in the blood. Similarly, haptoglobin infusions could conceivably be performed for the purpose of exercising the sole known biologic function of this protein, namely to bind hemoglobin.

In transfusion reactions (and in Blackwater fever), large amounts of free hemoglobin are released into the circulation. The hemoglobin is first bound by the available haptoglobin. Amounts in excess of the hemoglobin-binding capacity of the plasma will go into the glomerular filtrate and thence into the urine. A small amount of hemoglobin may possibly be resorbed by the tubules (6). Hemoglobinuric nephrosis is a not uncommon consequence of transfusion reactions. Its etiology is uncertain; however, it may be due to the precipitation of hemoglobin crystals in the acid pH of the tubules causing obstructive nephrosis. It is interesting to speculate whether administered haptoglobin, by binding hemoglobin, might prevent renal damage.

SUMMARY

Haptoglobin is a recently discovered plasma protein having the specific property of binding hemoglobin. Genetic polymorphism in human haptoglobins has been demonstrated by means of starch gel electrophoresis. The metabolic pathway of haptoglobin has not been clearly worked out. The plasma level of haptoglobin can be quite easily estimated, and such estimation may be important in the diagnosis of certain diseases, especially hematologic disorders involving excess hemolysis. Lastly, the possible therapeutic value of purified haptoglobin is discussed.

ACKNOWLEDGMENT — I wish to thank Drs. Connell, Murray, and Crookston for their kind advice on the preparation of this manuscript.

BIBLIOGRAPHY

1. Polonovski and Jayle; C.R. Soc. Biol. (Paris), 129, 457, 1958.
2. Smithies; Nature, 175, 307, 1955.
3. Smithies and Walker; Nature, 176, 1265, 1955.
4. Galatius-Jensen; Acta genet., 7,549, 1957.
5. Laurell and Nyman; Blood, 12,493, 1957.
6. Smith; The Kidney-Structure and Function in Health and Disease, Oxford, 1951.
7. Murray, Connell, and Pert; Fed. Proc., in press.
8. Murray and Connell; in press.
9. Connell and Smithies; Biochem. J., 72,115, 1959.
10. Nyman; Scand. J. Clin. Lab. Invest. (suppl.) vol. II, #39.
11. Poulik; J. Immunology, vol. 82, #6, June 1959, 502.
12. Nasslin and Nyman; Lancet, May 10, 1958, 1000.

ABSTRACT: An 11-B-Hydroxylase Inhibitor in the Treatment of Resistant Ascites; *S. Shildon and J. McLaren;* B.M.A.J., Dec. 1960.

Metopirone, a compound which selectively inhibits aldosterone production in the adrenal, was assessed as a diuretic alone, and in combination with chlorothiazide and spironolactone, in two patients with cirrhosis and resistant ascites.

When used with chlorothiazide, it increased urinary sodium excretion. Addition of spironolactone, an aldosterone antagonist at the renal tubular level, potentiated this diuresis. It is thought this latter effect was due to the blocking by the spironolactone of aldosterone precursors which have some salt-retaining properties and which accumulated due to the effect of the metopirone.

ECTOPIC PREGNANCY

MARTIN JERRY, 6T1.

An ectopic pregnancy is frequently misdiagnosed because it is infrequently considered. "The man who suspects every woman of having the condition is the man who is least liable to err in diagnosis". One is dealing, in effect, with an acute abdomen, and all appropiate principles of diagnosis relevant to that state apply. Inaccurate history and physical examination, failure to do a rectal and pelvic examination, or to examine the hernial sites or costovertebral angles. It is helpful to analyse the findings in terms of an intraperitoneal or extraperitoneal lesion. An intraperitoneal lesion has a triad of characteristics which in order of importance are;

1. Associated pain and tenderness. The point of maximum pain felt by the patient and the point of maximum tenderness elicited by the examiner coincide.
2. A point of maximum tenderness.
3. Signs of peritoneal irritation; sharp, stabbing, steady pain aggravated by movement, coughing, blowing out the belly; rebound and referred tenderness; Rovsing's sign; etc. Other signs such as hyperesthesia and rigidity may be equivocal. In extraperitoneal lesions, this triad of findings is absent. Such lesions may be considered as lying above, below, on either side, behind, or in front of the peritoneal cavity. A working knowledge of the gross anatomy of these areas along with a listing of the commoner pathological conditions affecting the constituent parts will soon elicit the correct diagnosis.

Gynecological complaints often present with lower abdominal pain that radiates through to the back. Most abdominal catastrophies start off with nonspecific symptoms of malaise, anorexia, epigastric discomfort, nausea and vomiting, and may progress for 4 to 8 hours before distinctive signs and symptoms appear. Therefore, repeated examination of the patient may be required.

DIAGNOSIS

The Quiet or Chronic Picture: That seen consequent to intraperitoneal bleeding from the tube which is small in amount or recurrent (tubal abortion and mole).

History: May be one of previous pelvic inflammatory disease, of an abdominal operation (adhesions), of infertility, of a previous ectopic gestation. This is often the first conception of a woman who has been married some years, or of a parous female who has not been pregnant for several years.

A short period of amenorrhea with or without symptoms of early pregnancy. If tubal abortion occurs in less than a month's gestation, there may be no menstrual change observed.

Colicky pain in one or other iliac fossa or in the hypogastrium from tubal distension or contractions occurring when the period is overdue a few days may be present. This with vaginal bleeding will suggest abortion.

Symptoms resulting from chorio-decidual hemorrhages and/or escape of blood into the peritoneal cavity include, attacks of lower abdominal pain varying directly in severity with the extent of the blood loss with associated syncope varying from faintness to collapse; shoulder tip and epigastric pain aggravated by respiration and caused by blood tracking to the diaphragm when the patient lies down; slight vaginal bleeding originating chiefly from the uterus and to a lesser extent from the tube, which may be mistaken for a late period; menstrual irregularity is more common than distinct amenorrhea; the bleeding may stop temporarily then restart. Once begun, it usually continues without intermission as a characteristic dark brown discharge, but is absent altogether in 15% of cases.

Physical Examination: Signs of early pregnancy in the breasts may be present although there is usually not enough intraperitoneal blood to give signs of free fluid in the abdomen, there will be signs of peritoneal irritation in the affected lower quadrant with doughy rigidity in some degree and tenderness. A hemoperitoneum of 2-3 weeks duration may give periumbilical bruising (Cullen's sign), an inconstant finding pathognomonic only of longstanding intraperitoneal bleeding. Vaginal findings may include the signs of pregnancy, arterial pulsation in the affected fornix on the affected side, an irregularly enlarged and tender appendage on the affected side, an ill-defined, tender semi-solid swelling in the Pouch of Douglas caused by pelvic hematoma, and severe pelvic tenderness. Pallor; tachycardia; slight intermittent pyrexia (100-101 F.) caused by absorption of degenerative products of the intraperitoneal blood; occasionally, an elevated serum bilirubin with slight jaundice from hemolysis; and slightly elevated E.S.R. ang W.B.C. A high W.B.C. with a low hemoglobin is indicative of a longstanding hemo-

peritoneum. There may be intestinal distension. A decidual cast may be seen which shows no chorionic villi. Float it out on water to show its size and shape.

That seen consequent to a pelvic hematocele which has formed either following repeated slight hemorrhages or after an acute rupture with moderate hemorrhage from which the patient has temporarily recovered.

In the former, the patient has experienced repeated attacks of lower abdominal pain with faintness but no acute collapse. In the latter, there is a history of an acute attack of lower abdominal pain and fainting which is attributed often to a fainting spell or heart attack. The patient complains of abdominal pain and weakness, or vaginal bleeding, or urinary retention or frequency.

On examination, a tender boggy tumor is felt to fill the Pouch of Douglas. Otherwise, history and physical findings are similar to the chromic picture.

The Dramatic or Acute Picture

This seen when a sudden massive intraperitoneal hemorrhage follows a tubal rupture. It may supervene on a chronic picture. Ruptures usually occur around the first 8 weeks of gestation (interstitial pregnancies at 3-4 months).

History: 75% of cases show a history of short amenorrhea and symptoms of early pregnancy may be present. 90% experience the sudden onset of severe pain in one iliac fossa or in the hypogastrium. Shock follows immediately. Either death soon follows or else hemorrhage is temporarily arrested and the general condition of the patient improves over the next few hours. Pain, however, persists and is referred to the epigastrium and shoulder.

Physical Examination: There will be signs of shock, acute anemia, and peritoneal irritation in the lower (and sometimes, the upper) abdomen which is acutely tender and presents a doughy rigidity to palpation. There is enough free blood in the peritoneal cavity to show signs of free fluid. The flanks are dull to percussion and the anterior abdomen tympanitic (intestinal distension).

Vaginal examination should be performed with trepidation for fear of precipitating more hemorrhage. Findings here include changes due to pregnancy; a firm or boggy enlarged very tender appendage on the affected side (5 — 15 cm. in diameter) which may displace the uterus; and severe pelvic tenderness.

Subnormal temperature, elevated W.B.C., slightly elevated E.S.R., and a depressed hemoglobin will also be present.

SPECIAL INVESTIGATIONS

An Ascheim-Zondek test for pregnancy does not distinguish between intrauterine and extrauterine gestations, and is positive in only 50% of ectopic pregnancies when they present clinically. When the placental tissue has ceased to have contact with the maternal circulation the test will become negative; hence, a negative test does not rule out an ectopic pregnancy.

An examination under anesthesia will reveal the swollen appendage. This procedure is dangerous in that it may induce tubal rupture or further hemorrhage. Be prepared to follow it with an immediate laparotomy if this is indicated to control hemorrhage.

Posterior colpotomy is performed when the results of the EUA are equivocal. Blood can be aspirated from the cul-de-sac through a large bore needle passed through the posterior vaginal fornix. Occasionally, blood may be withdrawn when no ectopic gestation is present, or may be absent when an ectopic gestation is present. Consequently, Jeffcoate prefers to explore the cul-de-sac through a small incision into the posterior vaginal fornix.

Culdoscopy involves the insertion of an endoscope into the cul-de-sac through the posterior vaginal fornix under local, spinal, or general anesthesia with the patient in a knee-chest position to protect the intestines which fall down and away, and to induce a pneumoperitoneum. The tubes, posterior to the uterus, and ovaries can be visualized. Colored fluid is injected through the cervix and its passage along the tubes is observed to determine their patency. This examination is contraindicated in the presence of vaginal infection, fixed uterine retroversion, and a mass in the Pouch of Douglas. After the endoscope is removed, an AP radiogram of the pelvis outlined with the pneumoperitoneum is taken (gynecography). There is no need to suture the puncture hole.

A Diagnostic Curettage may be performed to distinguish between abortion of an intrauterine pregnancy (chorionic villi and decidua) and an ectopic gestation (decidua only). Absence of decidua (which may have already disintegrated) does not exclude an ectopic pregnancy.

TREATMENT

The philosophy of management is becoming more conservative in order to preserve a maximum of reproductive tissue and reproductive ability. When the diagnosis is made or suspected, hospitalize the patient immediately. Treat shock

first, however. No vaginal examination is to be done at this time.

Definitive Treatment

As soon as the diagnosis is made, a laparotomy should be done, with blood available or tranfusion for shock already in progress. By examining the opposite tube and ovary, and by assessing the nature of the lesion, the patient's future reproductive capacity and her age, decide on one of the following procedures listed in order of preference:

Salpingotomy with Salpingoplasty; if hemorrhage is easy to control (tubal abortion), milk the pregnancy through the abdominal ostium of the tube or incise the tube parallel to its long axis along the antimesenteric border over the pregnancy, shell out the conceptus, and close the wound with catgut sutures. Bleeding is controlled by tying off vessels in the mesosalpinx. This procedure is indicated when the the affected tube is the only functional one and the patient is desirous of more children. The operation, however, leaves a damaged tube with the possibility of a recurrent ectopic gestation.

Salpingectomy or Salpingoophorectomy; the tube is totally or partially removed along with the uterine cornua if the pregnancy is interstitial. The ovary is conserved if possible for its endocrine function. Some authorities would remove this ovary, however, for they argue that when an ovum is produced on the side of the operation it can be fertilized and implanted only following external transmigration to the opposite intact tube. The resulting delay in time increases the probability of an ectopic implantation.

Hysterectomy; may be performed in addition to salpingectomy or salpingoophorectomy in a woman in good condition, over 40 years of age, who possesses either a diseased uterus or widespread pelvic adhesions which are responsible for the ectopic gestation.

Non-operative Treatment; where signs and symptoms are minimal and subsiding, and where the Aschheim-Zondek test is negative, the obstetrician may elect to await spontaneous resolution of the condition. Such a conservative approach is, however, potentially dangerous.

CONCLUSION

This paper has attempted to survey and summarize in a practical fashion principles of diagnosis and management of ectopic pregnancy. Ampullary gestations are common, isthmial, rare; interstitial, very rare; and ovarian, intraligamentary and cornual, extremely rare. All present the same clinical picture. In ovarian pregnancies, the affected ovary is excised; in cornual ones, the horn is removed. (a pregnant horn contracts, a fibroid does not) Cervical gestations usually abort; the ensuing hemorrhage may necessitate hysterectomy.

ACKNOWLEDGMENT — The author thanks Dr. I. Van Praagh for willing guidance.

CONVULSIVE DISORDERS

C. H. TATOR, 6T1.

"Convulsions are paroxysms of muscular contractions". This is a good working definition of convulsions because it includes almost all the disorders commonly considered convulsive and does not confuse the issue by reference to the state of consciousness. However, even this simple definition is not beyond reproach. For example, in *petit mal* epilepsy there may be no "paroxysms of muscular contractions".

CLASSIFICATION

Etiological

The disorders are classified as idiopathic or symptomatic. This is based on the premise that there is an underlying organic lesion responsible for the attacks in the symptomatic types whereas no organic lesion is present in the idiopathic types. There are two fallacies in this method of classification. The first is that it implies that the seizures in the symptomatic types are due solely to the organic lesions; this is incorrect for it does not consider all the factors which may trigger off seizures. The second fallacy is that it implies that there is no organic lesion in the idiopathic types when all that can be justifiably stated is that there is no lesion demonstrable by the techniques available today.

Clinical

The second method of classification is based on the signs and symptoms of the attack. This method is valuable since it offers the clinician important clues as to the cause of the disorder and may indicate an area of the brain involved which thus serves as a guide in the direction of therapy.

Table 1 has been formulated so as to combine the best features of the two classifications. It attempts to underline the importance of the clinical features of the convulsive disorders as a guide to their etiology.

CONVULSIVE DISORDERS

<table>
<tr><th>CLINICAL TYPE</th><th>CLINICAL CHARACTERISTICS</th><th colspan="2">ETIOLOGY</th></tr>
<tr><td></td><td></td><td>INTRACEREBRAL</td><td>EXTRACEREBRAL</td></tr>
<tr><td>GRAND MAL

— 75% of cases

— majority of these are idiopathic.</td><td>GENERALIZED CONVULSION

BILATERAL — NO FOCAL ASPECTS

Aura — 50%
↓
Unconsciousness
↓
Tonic convulsion
↓
Clonic convulsion
↓
Postictal confusion

and/or automatism

There may be urinary or fecal incontinence.</td><td>CONGENITAL — birth trauma, agenesis, cranio-synostosis.

TRAUMATIC — concussion, hemorrhage.

IDIOPATHIC

INFECTIOUS — brain abscess, meningitis, encephalitis, G.P.I.

NEOPLASTIC — primary, secondary.

DEGENERATIONS and DEMYELINATING DISEASES Lipoid storage, Jacob-Kreutzfelt, tuberous sclerosis, Schilder's disease, multiple sclerosis.

CIRCULATORY — A-V malformations, senile arterio-sclerosis.</td><td>SYSTEMIC

Anoxia — Stokes-Adams attacks, congestive heart failure, severe anemia, hypotension, CO poisoning, hyperactive carotid sinus.

Hypertension — eclampsia, encephalopathy.

METABOLIC — alcohol withdrawal, barbiturate withdrawal, hypoglycemia, hypocalcemia and tetany, uremia, metal toxicities — lead and strychnine, phenylketonuria, hypomagnesia, water intoxication, hyponatremia.

FEBRILE — hyperpyrexia in any infectious disease (1/3 of convulsions in children).

INFECTIOUS — tetanus

PSYCHOGENIC — hysteria, hyperventilation syndrome.</td></tr>
<tr><td>FOCAL SEIZURES

— 7% of cases</td><td>UNILATERAL - 2 TYPES

FOCAL MOTOR — twitching of distal parts of limb
↓
Jacksonian march of the twitching proximally up the limb.
↓
may or may not lose consciousness and progress to generalized convulsion.

— may start on one side of face
— may start with turning of head and eyes to one side

FOCAL SENSORY — similar to focal motor.
Numbness or "pins and needles" sensations replace twitching
↓
"March"
↓
± loss of consciousness and generalized convulsion.</td><td colspan="2">Due to abnormality of limited area of brain. Lesion is usually cortical or subcortical in pre- and post-rolandic areas.
Almost never associated with an extracerebral cause.

CONGENITAL — birth trauma, agenesis, vascular malformation, cerebral palsy.

TRAUMATIC — Hemorrhage — extradural, subdural, intracerebral.
— Parenchymal damage — concussion, contussion, laceration, post-traumatic cicatrix.

VASCULAR — thrombosis, (venous or arterial), embolism, and infarction, hemorrhagic.

INFECTIOUS — brain abscess, meningitis, G.P.I., emcephalitis, parasitic infections.

DEGENERATIVE and DEMYELINATING DISEASES — as above

NEOPLASTIC — primary and secondary tumors.</td></tr>
</table>

CLINICAL TYPE	CLINICAL CHARACTERISTICS	ETIOLOGY
PSYCHOMOTOR — 9% of cases — uncommon in children	Great range of manifestations — bizarre Psychic Elements — aura, hallucinations, *déjà-vu,* loss of consciousness, amnesia. Motor Elements — automatism, abnormal twisting movements, chewing, smacking of lips, etc. — Many will also have grand mal seizures.	NEVER EXTRACEREBRAL IN ORIGIN. LESION IS USUALLY IN OR NEAR THE ANTERIOR PORTION OF ONE TEMPORAL LOBE. LESION MAY BE ALMOST ANY ONE OF THE LESIONS LISTED ABOVE UNDER "FOCAL SEIZURES".
PETIT MAL TRIAD — 9% of cases	THREE TYPES 1. Simple Staring Spell 2. Myoclonic Jerks — sudden involuntary contractions of trunk or limbs. — may be followed by grand mal seizure. 3. Akinetic Seizure — sudden loss of tone of all muscles of body. — may have brief loss of consciousness. — may be followed by grand mal.	ARE NEVER EXTRACEREBRAL IN ORIGIN. ALMOST NEVER BEGIN IN ADULTS WITH ORGANIC BRAIN LESIONS. IDIOPATHIC — no demonstrable brain lesion. The abnormal discharge probably originates from a subcortical area, probably the thalamic nuclei. MISCELLANEOUS — a small number due to birth injuries, developmental defects or following acute febrile illnesses of childhood.

DIAGNOSIS

It is apparent from this table that the differential diagnosis of the convulsive disorders is mainly concerned with answering the following questions; Is there a focal lesion in the brain which demands prompt attention? Is there an extracerebral cause present such as a metabolic disorder or a systemic disease which can be controlled? Or will the convulsion prove to be idiopathic and require attention now and on a long term basis?

History: The patient or relatives should be questioned closely as to the patient's previous health, whether there were previous seizures, and the manifestations and treatment of these seizures. It is important to inquire what diseases the patient has or has had, whether there has been personality changes, disturbances of consciousness, ingestion of drugs such as insulin, or poisons, or exposure to toxic gases. Enquiry is also made concerning any recent vomiting, diarrhea or hemorrhage, and whether or not the patient is pregnant. The history often suggests the type and cause of the convulsions. For instance, if the patient is a diabetic your attentions will immediately be directed to ruling out diabetic coma and hypoglycemia.

Physical Examination

General: Look for signs of anoxia, edema, anemia and check for fever, presence of trauma, and for cardiovascular disease. Seek evidence of respiratory embarassment, ingestion of toxic substances, drug overdosage or habitual use of drugs. It is also worthwhile to look for injuries which may have been sustained as a result of the convulsions, such as a bitten tongue or dislocated shoulder.

Neurological: In doing the neurological examination, three main areas must be assessed — the level of consciousness, the presence of generalized neurological disease or that which is focal in origin. The level of consciousness is an important indication of the severity of the convulsions and is used as a valuable index of the progression of the disease. To determine the presence of generalized or focal neurological disease, the examiner should look for signs of increased intracranial pressure, changes in the fundi, neck stiffness, pupillary signs, and spasms of isolated groups of muscles, for example, the carpopedal spasm of tetany and the trismus of tetanus.

Syncope and Hysteria: Syncope is usually due to a decrease in the blood supply to the brain, the cause almost always extracerebral in origin. Whether "paroxysms of muscular contractions" occur in a syncopal attack is probably related to the degree of the change in the quantity or quality of blood supply to the brain and to the individual's seizure threshold. Many extracerebral disease may therefore result in syncope or convulsions or both. Simple syncope may often have been a convulsion in which the convulsive elements went unnoticed. Hence, certain cases of

syncope should be scrutinized for convulsive elements and for the same extracerebral causes of convulsions.

Hysteria often presents in the form of convulsive seizures. The hysterical patient usually gives himself away by the bizarre nature of the attack and by confining it to a large audience. The state of consciousness is a valuable guide to the diagnosis because the hysterical patient can often be roused from a major seizure by a painful stimulus. However, at other times the differential may be extremely difficult considering, for example, the bizarre attacks which may occur in psychomotor epilepsy.

Further Investigation: This will be based on a clinical assessment of the patient's condition and no hard and fast rules can be applied. In general, your hand is forced by such criteria as grave changes in the vital signs, decreasing levels of consciousness in the presence of focal neurological signs and lack of response to treatment. Some of the investigations which may be urgently required and done quickly are skull X-rays, CSF examination, Hb. and W.B.C., and urine sugar and ketone determinations. Briefly, some subsequent investigations which may be required are serum calcium, blood sugar, E.E.G., E.C.G., diagnostic burr holes, pneumoencephalogram, carotid arteriograms and in children, subdural taps.

TREATMENT

The majority of patients with convulsive disorders do not present on an emergency basis. However, there are a considerable number of situations in which the need for immediate therapy is crucial and these situations will now be discussed.

General Measures

Establishing an airway is of prime importance as is the treatment of shock. If there are signs of head trauma and the patient is deeply comatose, breathing inadequately, cyanosed and unable to eliminate secretions, then tracheotomy, suction and oxygen may be required. According to the severity of the situation, the patient should be observed closely, the vital signs being recorded at frequent and regular intervals. The patient should be placed in an appropriate position where he will not injure himself during a convulsion.

Specific Medical Therapy

Status Epilepticus: This is defined as recurrent convulsions occurring with such great frequency that consciousness is not regained in the interval between the convulsions. For adults, the drugs, the drugs commonly used are Phenobarbital Sodium, 400-800 mg., I.V., or amobarbital sodium, 500-1000 mg., I.V. For children, usually half these amounts are given but the dosage should be tailored to the child's weight. If these fail to control the seizures, Dilantin is given at the rate of 50 mg. per minute I.V., or through a stomach tube. 100-200 mg. may be required and as much as 500 mg. per day may be administered. Other drugs which may be used are intravenous paraldehyde or ether or pentothal anesthesia.

If the convulsions continue unabated then hyperthermia and its anoxic effect will result. This can be effectively controlled by alcohol sponges, cool compresses or ice packs applied to the body surface.

Febrile Convulsions: Most cases occur in infants and children during the course of an acute infectious disease. Immediate therapy is designed to lower the temperature with alcohol sponges, cool compresses or ice packs and to control the convulsions with sedative drugs. Paraldehyde is usually administered first in the dosage of 1 cc. per 10 lbs. body weight either intramuscularly or I.V. as a 5% solution in a 2/3 5% glucose — 1/3 normal saline infusion. In the interim, ether may be given by mask. If the convulsions continue, Dilantin may be required.

Hypoglycemia: This is easily remedied by the I.V. administration of 10-20 cc. of a 50% glucose solution. Oral sugar may be given provided the patient is conscious.

Tetany: 10% calcium gluconate injected slowly I.V. is effective in relieving the symptoms of hypocalcemia. 10-30 cc. are usually required but the rate should be so adjusted that hourly determination of urinary calcium by means of the Sulkowitch test will be positive.

Tetanus: The principles of treatment of tetanus are sedation and administration of large doses of antiserum. Amobarbital sodium in doses of 250-1000 mg. can be given orally, subcutaneously or intravenously depending on the urgency. Antitoxin is given when adequate sedation is achieved — 100,000 units I.V. dosage.

Alcoholism: To combat the edema of delirium tremens, 100 cc. of a 50% glucose solution I.V. has been used. Massive doses of vitamins and magnesium sulfate are given orally.

Specific Surgical Therapy

Neurosurgery may be necessary for diagnostic or therapeutic reasons. The former have been mentioned; the latter may consist of evacuation of hematomas and ablation of tumors or abscesses. In all cases, medical therapy is needed prior to surgery to improve the patient's condition.

SUMMARY

A clinical classification of the convulsing patient has been presented. Diagnostic means have been briefly considered and therapy appropriately discussed.

Homewood Sanitarium

A private hospital for the diagnosis, care and treatment of all types of psychiatric disorders. An adequate staff of specialists study each patient carefully and fit the treatment to his individual needs. Excellent cuisine, comfortable accommodation and personal attention of specially trained nursing staff contribute to the recovery of the patient. All types of modern therapy are available, including Psychotherapy, Insulin and Electro-shock, combined with excellent Occupational and Recreational facilities. The Sanitarium buildings, accommodating 225 patients, are situated in a very attractive setting within the confines of the City of Guelph.

Homewood has been approved as a private hospital under the Ontario Hospital Insurance Plan. Benefits depend on type of illness and other factors. For full information write or telephone (TAylor 4-1010).

A. L. MacKINNON, M.B., Medical Superintendent

THE HOMEWOOD SANITARIUM OF GUELPH, ONTARIO, LIMITED

A PRESCRIPTION PHARMACY DESIGNED TO MEET THE PHYSICIAN'S PROFESSIONAL NEEDS

OSBORNE'S PHARMACY

M.R. OSBORNE, Phm, B.

Ground Floor, Medical Arts Bldg.

WA. 2-2156

Our Dispensary is Open From 8:30 a.m. Until Midnight Daily

ANSWERS TO ON INSPECTION

Fig. 5 — CARCINOMA OF THE VULVA

The third most common gynecological cancer, this is a disease of elderly women usually between 60 and 70 years of age. Over one half are preceded by leukoplakia; some occur in conjunction with granuloma inguinale and lymphopathia venereum. The lesion is of the squamous cell variety (occasionally adenocarcinoma from Bartholin's gland) which begins on the labia, clitoris, vestibule or vulvovaginal gland as a nodule which soon ulcerates and steadily destroys most of the vulva with induration, ulceration and edema. Early symptoms are slight soreness and pruritis; later, pain becomes severe. The lesion metastasizes to the superficial and deep inguinal glands, in the femoral ring and pelvic glands. Diagnosis is by biopsy. Treatment is surgical, the 5 year survival being upwards to 50% of cases.

Fig. 6 — COLLOID GOITRE

A goitre (Struma) is an enlargement of the thyroid gland which may be diffuse or nodular (adenomatous) and may be associated with hypo-, hyper- or euthyroid states. The classification:

Colloid (edemic, simple, iodine deficiency) goitre.
Diffuse goitre with hyperthyroidism (exophthalmic goitre, Grave's or Basedow's disease).
Nodular (adenomatous) goitre with or without hyper- or hypo-dysfunction.
Degenerative and inflammatory goitre.
amyloid goitre,
tuberculous thyroiditis,
granulomatous (subacute, giant cell) thyroiditis,
lymphocytic thyroiditis,
lymphadenoid goitre (struma lymphomatosa),
Riedel's struma.
Neoplastic goitre — benign (adenoma) or malignant (carcinoma).
Drug induced hyperplastic goitres
cyanates
sulfonamides
thioureas.

Fig. 7 — CARCINOMA OF THE BREAST

This classification is based on location of the lesion anatomically, biological activity, and histological appearance of the tumor.

1. Carcinoma of the Nipple.
   Paget's disease.
2. Carcinoma of the Ducts.
   Non-infiltrating (i.e., carcinoma-in-situ).
   Papillary
   Comedo (i.e., central necrotic softening that gives the appearance of the comedos of acne).
   Infiltrating
   Papillary
   Comedo
   Scirrhous (i.e., much fibrosis causing it to be hard to palpation)
   Medullary carcinoma with lymphoid infiltration. It is general principle that such lymphoid infiltration represents such a good host reaction that the tumor in question is relatively less malignant to the host.
3. Carcinoma of the Lobules — infiltrating and non-infiltrating.
4. Miscellaneous
   Mucoid (colloid) carcinoma
   Sweat gland carcinoma
   Carcinoma developing in a fibroadenoma
   Acute inflammatory carcinoma. Tumor develops in the breast of a lactating female where there is lymphatic and venous engorgement. Hence, the spread is so fulminating, and widespread infiltration of these channels so marked so rapidly, that an acute inflammatory reaction of the whole breast results.

In summary, a practical grouping based on frequency would be; Paget's disease — rare; Lobular carcinoma — rare; Duct carcinoma — infiltrating; papillary — 1.6%, hard (scirrhous) - 80%, medullary — 2.5%.

Fig. 8 — SWOLLEN ARM FOLLOWING RADICAL MASTECTOMY

See page 206

PRINCESS MARGARET HOSPITAL

The Ontario Cancer Institute, incorporating the Princess Margaret Hospital, was established in 1957 to provide complete facilities for cancer research, diagnosis and treatment, exclusive of major surgery. Over 2,500 new cases are admitted each year, and over 14,000 follow-up examinations carried out.

Applications are now being accepted for RESIDENT TRAINING IN THERAPEUTIC RADIOLOGY. Appointments for the 1961-62 session will be available in each of the three years of the hospital's training program, accredited by the Royal College of Physicians and Surgeons of Canada, for Certification or Fellowship in the Specialty.

Address enquiries to
Dr. T.C. Brown,
500 Sherbourne Street,
Toronto 5, Canada.

The swelling is due to edema from one or more of

1. Disruption of lymphatic pathways,
2. Low-grade infection,
3. Thrombosis of the axillary vein,
4. Vascular fibrosis following X-Ray therapy.

It is treated by elevation, massage and the use of an elastic arm bandage.

ABSTRACT: The Correction of Clubfoot by Utilizing the Controlled Withdrawal Reflex; *M.B. Furlong and G.W. Lawn:* Archives of Pediatrics, Vol. 77. August 1960, 11. 317-34.

Talipes equinovarus, while easy to correct initially, is difficult to maintain corrected. The Dennis Browne crossbar splinting technique utilizes kicking movements to stretch the shortened muscles and develop power. The English lateral splinting method utilizes passive stretching and special exercises but depends on cooperation from the infant. Sequential correction by abduction, eversion, and dorsiflexion in serial plaster casts is widely practised in North America. Recurrence of deformity with all these techniques is felt to occur because the original muscle imbalance is not corrected. The authors advance a technique of correction (anatomical and functional), retention, and supervision utilizing the fact that motor reactions at birth are entirely reflex due to lack of cerebral maturity. Three reflex patterns are elicited by plantar stimulation — the withdrawal reflex, the crossed extension reflex, the Frankel reflex (reinforcement of dorsiflexion by restraint of the withdrawal reflex). These exercise all the muscles required to correct imbalance. Also, the method eliminates the anticorrective reflex resistance offered against repeated cast applications.

A midthigh-to-toes corrective cast is applied with the foot forced into the neutral position. The portion enclosing the dorso-lateral aspect of the foot is removed in two stages over a period of two weeks. At the same time, felt forefoot wedges are used to progressively correct varus, supination, and heel inversion, the foot swinging laterally through the defect in the cast. At three weeks, before the calf muscles develop strength, the part covering the anterior aspect of the ankle and lower foreleg is removed allowing free dorsiflexion of the foot, now corrected anatomically. Beginning with the first day of treatment, reflex stimulation is begun by stroking the sole 20-25 times daily and passive stretching is carried out at all stages in the directions allowed by the cast defects. Felt sole-wedges are used to maintain the increasing limits of dorsiflexion. The same principles are followed utilizing a second cast when the first becomes too small.

When full correction has been achieved, the cast is removed and leg splints used for about four months in the retention phase of treatment. Reflex stimulation is continued to impress the correct muscle balance pattern on the developing suprasegmental levels of nervous function. Relapse is prevented by observation and supervision in the final phase of treatment. No special shoes, exercises, or walking patterns have been found necessary and five patients thus far treated show excellent functional and cosmetic results.

"DOES HE OR DOESN'T HE . . . ?"

subscribe to the *University of Toronto Medical Journal?* Since only 0.0077% of the population of Canada do, we consider it highly unlikely that this lonely little man has a subscription. Besides he looks too smug to want to be in the know.

This year a number of our more discriminating grads have obtained subscriptions to "the new Journal". Pass the word along to one not as fortunate as you. There's more to come; guaranteed to be different; bound to be interesting.

UNIVERSITY OF TORONTO MEDICAL JOURNAL

ABSTRACTS

ABSTRACT: An Appraisal of Certain Tests for the Detection of Hypertension of Unilateral Renal Origin; *Samuel T.R. Revell et al:* Annals of Internal Medicine, Nov. 1960.

An assessment is given of a variety of tests which are utilized in the detection of hypertension of unilateral kidney disease.

Studies of the differential excretion of urine and sodium are technically difficult and subject to both false negative and false positive results. Renal angiography is potentially dangerous and may give false positive results. The tetraethyl ammonium chloride test may give both false negative and false positive results. The authors conclude that as yet there is no completely reliable test to detect correctable renal hypertension.

●

ABSTRACT: Significance of Serum Complement Levels for the Diagnosis and Prognosis of Acute and Subacute Glomerulonephritis and Lupus Erythematosus Disseminatus; *Kurt Lange et al:* Annals of Internal Medicine, Oct. 1960.

Serum complement levels were markedly depressed in 245 of 246 patients with acute glomerulonephritis. Levels returned to normal in most cases at the time that healing occurred. Persistence of low levels indicated a poor prognosis. Thirty-two of 43 cases of acute disseminated lupus erythematosus showed lowered levels of complement. The lowered levels in these diseases is thought to be due to the binding effect of antigen-antibody reactions.

●

ABSTRACT: Prophylactic Hemodialysis in Renal Failure; *T.R. Tesehan et al:* Annals of Int. Medicine, Nov. 1960.

Prophylactic hemodialysis was employed in the treatment of 15 patients with acute renal failure due to a variety of causes. The dialyses were begun before clinical evidence of uremia and/or before the NPN reached 200 mg. %, and were repeated often enough to maintain the NPN below 150 mg. %. It was hoped that this would prevent the development of clinical uremia with its often fatal sequelae. On the basis of their results of treatment, the authors feel that prophylactic hemodialysis results in fewer complications combined with a better outlook for survival.

DOWNS

SURGICAL
INSTRUMENT
MANUFACTURERS
FOR NEARLY 100 YEARS

YOUR TORONTO
HEADQUARTERS
FOR
MEDICAL SUPPLIES
OF THE
HIGHEST QUALITY

VISIT
OUR SHOWROOM
NEAR THE GENERAL HOSP.

DOWN BROS. AND MAYER & PHELPS LTD.
70 Grenville Street Toronto 5, Ontario - WA. 1-8737
HEAD OFFICE: LONDON, ENGLAND

"...and a pickle on top!"

The food cravings of an expectant mother may be frivolous. Choosing the formula for her baby is not.

Farmer's Wife have the widest variety of specialized milks . . . a choice of five . . . so that you may prescribe the feeding best suited to each infant.

With Vitamin D

Whole Milk
Partly Skimmed Milk
Skimmed Milk

With Vitamins C and D

Instant Prepared Formula
(Whole Milk)
Instant Prepared Formula
(Partly Skimmed)

Easily and quickly prepared. Available in 1 lb. tins especially designed for convenient opening.

Farmer's Wife
CANADA'S PREMIUM INFANT FORMULA MILKS

THE INTERNAL CLOCK

The ability to judge intervals of time is a basic mental function. In order to learn how drugs affect this "internal clock," SK&F scientists use a test in which a monkey must hit a lever after an interval of 20 seconds to obtain food.

When he is under the influence of certain drugs, "time flies" and he misses the pay-off period by hitting the lever too late. Other drugs make "time drag" and he misses the pay-off period by hitting the lever too soon.

Because one of the characteristics of many mental disorders is a distortion of the time sense, observing how drugs affect this primary psychological process may reveal valuable information that will help SK&F scientists in discovering effective treatments for mental illness.

SMITH KLINE & FRENCH • MONTREAL

pioneering in pharmaceuticals . . .
for better health

C I B A where research is the tradition

For your own private library
available to you at cost

The CIBA Collection of Medical Illustrations

Lifelike illustrations by Frank H. Netter, M.D.
Full-color plates of anatomy and pathology
Concise text-matter by recognized authorities
Cross-referenced index for each volume
Handsomely bound with green buckram covers stamped in gold

Vol. 1 – **Nervous System:** 122 color plates, 167 pages.
Supplement, **The Hypothalamus,** is included..... **$7.00**
(Supplement alone, $1.00)

Vol. 2 – **Reproductive System:** 233 color plates,
304 pages..... **13.00**

Vol. 3 – **Digestive System:**
Part I, Upper Digestive Tract:
172 color plates, 206 pages..... **12.50**
Part III, Liver, Biliary Tract and Pancreas:
133 color plates, 165 pages..... **10.50**
(Part II of Vol. 3 will be available later)

Other services from CIBA include:
Clinical Symposia, featuring special articles by leading medical authorities, and full-color illustrations by Frank H. Netter, M.D.
Medical Films are available on loan.
Slides of Medical Illustrations are loaned or sold at cost.

Please write for lists of films and slides to:
Ciba Company Limited, Dorval, Quebec

1418

C I B A